JUNE 3, 1957
50 CENTS

USAF reveals major breakthrough in materials . . Page 27
Gen. Baker warns of cutbacks in manned aircraft . . Page 30
IATA's Brancker looks ahead to jet age fares . . Page 53

AMERICAN AVIATION

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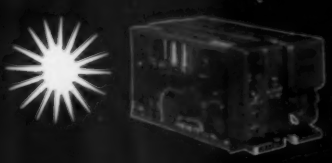

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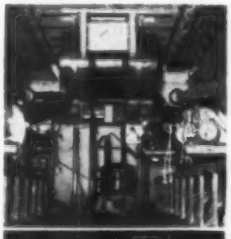
JUNE 3, 1957—VOL. 21, NO. 1

AMERICAN AVIATION

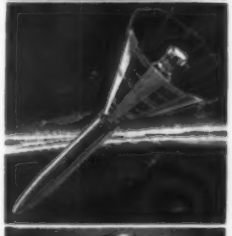
WORLD'S LARGEST AVIATION PUBLISHERS

PARKER PASK WASHBURN

ere has been a major breakthrough in materials.
e three men shown here, all associated with the University of California, ve developed a new ductile ceramic that AF says is superior to stainless el. For an exclusive analysis, see page 27.



erial spraying gets into the big plane class
wo YC-97 Stratofreighters are being used DeLong Aircraft Co. in an Agriculture ept.-directed DDT spraying project on Long and. For picture story, see page 34.



ACA finds blunt nose best for long-range issiles
Julian Allen, high-speed researcher, has won agency's Distinguished Service Medal for radical conclusion reached in 1953 but now released. Story page 39.

ill turbojet and turboprop fares differ?
W. S. Brancker, traffic director of IATA, alyzes the international structure of air res in an exclusive report to AMERICAN VIATION on page 53.

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63,700 Copies of This Issue Printed.

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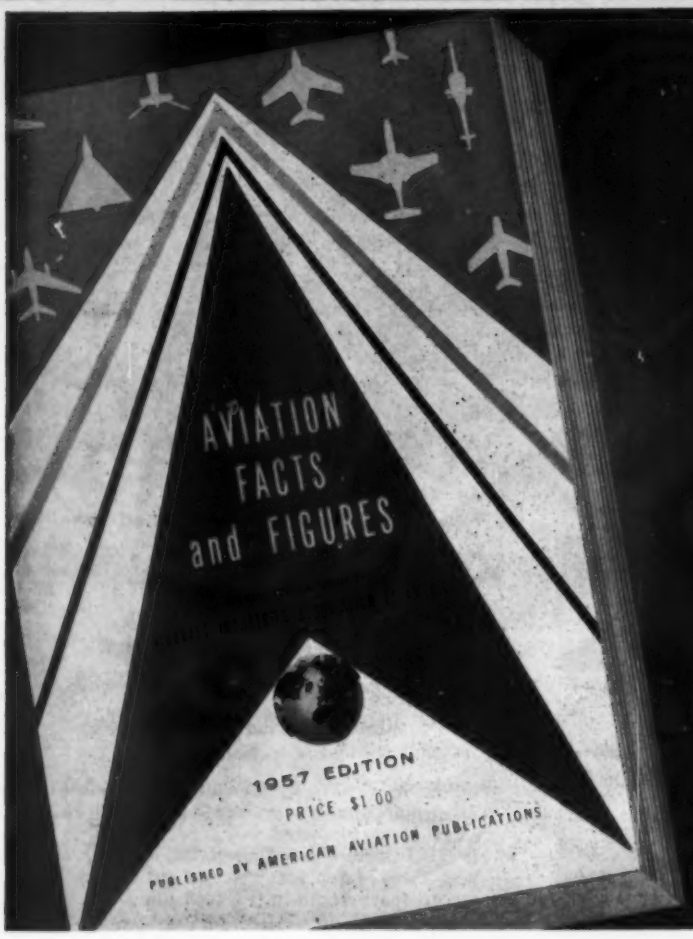
Among the American Aviation exclusive articles in this issue . . . is one of tremendous importance to aviation manufacturers—the discovery of a new ductile ceramic that could revolutionize designs. William Beller, Engineering Editor, reports the ceramic is heat-resistant to 5,000°F. For story see page 27. Another important exclusive is the analysis of future international air fares by John Brancker, IATA's traffic director, starting on page 53.



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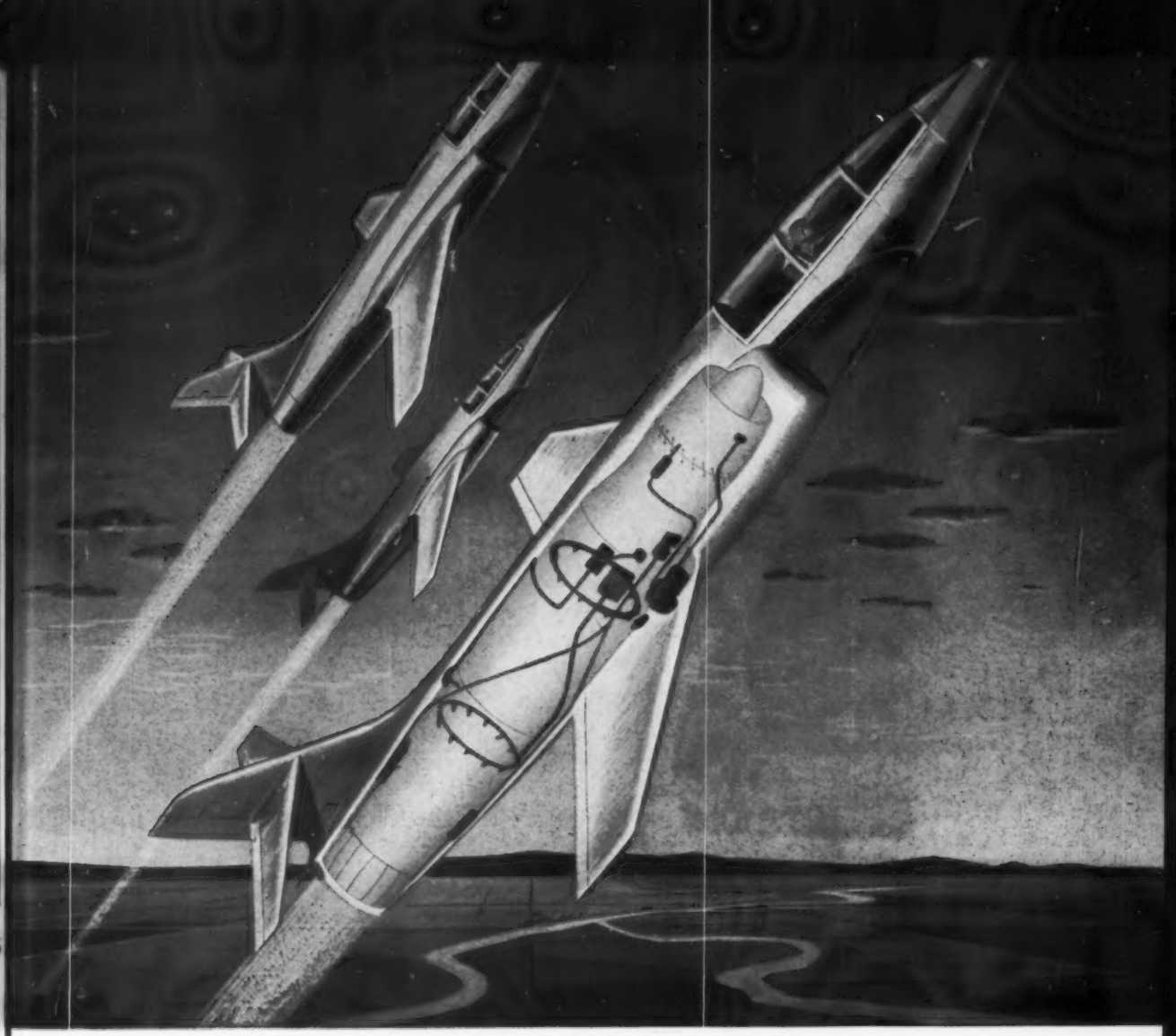

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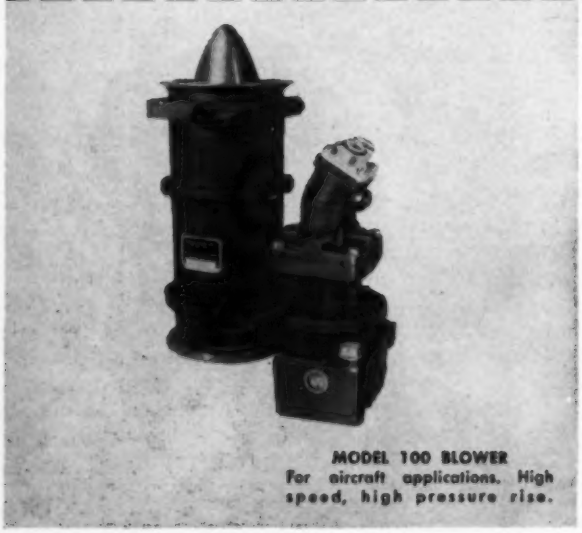

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PERSONAL VIEW

General Baker's Blunt Forecast

TO THE FEAST-AND-FAMINE aircraft manufacturing industry, the prospect of another impending major adjustment is not unexpected.

But it is a jolt, nonetheless, to hear a top Air Force procurement officer tell the industry he expects USAF acceptances of airframe and missile frame deliveries will be cut in half within the next two years.

In more than one respect, the forthcoming decline in airframe output differs from those inspired by earlier economy waves. This time the industry will be left—perhaps for good—with a massive 50 million square feet of excess plant space for which USAF says it no longer will have any use. USAF doesn't want it even on a standby basis.

Another aspect which has equally serious implications is the officer's obvious conclusion that the manned military airplane has about run its course under current USAF policies.

This time, it isn't the collapse of a sizable Defense budget that is causing the trouble. A powerful factor is diversion of larger and larger shares of the budget—to missiles, Sage, the Dew Line, foreign commitments, space research and a host of other items never before competing with airframes for portions of total funds.

Major General David H. Baker, Director of Procurement and Production for the Air Materiel Command, spelled out his forecast, in surprising detail, in a speech May 16 to business magazine editors. Previously he had warned the industry, also in public statements, about the dangers of over-facilitization. In his most recent talk he became more specific on procurement, details of which are reported in this issue. He departed from his text to comment (off the record) with unusual candor on the prospects of a few companies.

From an output of 11 million pounds of airframe a month at the peak of the Korean build-up, the trend has declined to a current 5 million. It is expected to increase temporarily to 6.5 by early 1958, and then current schedules call for a leveling off in 1959-60 to 2.5 million, where it would remain through 1962, according to General Baker.

The leveling off, however, doesn't tell the whole story. Much of the airframe output would be concentrated in a few companies. If General Baker's forecast is correct, the trend is moving steadily toward fewer air weapons systems and fewer prime contractors.

Industry has not been unaware of the trend, of course. Several companies have moved into nuclear energy projects. Almost all are in missile work to one degree or another. The Navy and Army will continue to be customers. Without an exception, every prime contractor will pull subcontracting back into its own plant. And those with commercial business will continue to do well.

Doomsday has not arrived, but some real belt-tightening is inevitable. General Baker's blunt warning, however, brings up a few questions. For example, is too much reliance being placed today in what missiles will be able to do in a year or so? Certainly, the public has an impression that missile development is much further along now than it is. A second question follows: Is the manned military phase-out getting under way faster than missile progress justifies? Already, several excellent aircraft designs have been shelved. There are highly respected military and industry leaders who hold the deep conviction that manned warplanes will be needed for many years to come.

Our Twenty Years 1937-1957

ON JUNE 1, 1937, appeared the first issue of a twenty-page news magazine called AMERICAN AVIATION. It was a struggling little venture launched on little capital but an abundance of faith and determination.

In these days a business firm has only a 20 per cent chance of surviving ten years with the same ownership, so we are proud that AMERICAN AVIATION and its publishing company have continued without change of name or ownership for two solid decades.

From the small beginnings of this one magazine a large publishing organization devoted exclusively to services to the aviation industry has been developed with such leaders as American Aviation Daily, Missiles & Rockets, Official Airline Guide, the Worldwide Directory, Who's Who in World Aviation, and others. It is the largest *aviation* publishing firm in the world. The original two employes have grown to 177. The company's payroll for two days in 1957 is larger than the total income for the first eight months of 1937.

American Aviation Publications has remained an independent enterprise. It is not part of a chain or a goliath corporation publishing business magazines in many fields. Aviation is and has been our sole interest and business. The twenty years have passed with breathtaking speed. They have been exciting and fruitful. We hope to continue to serve aviation with consistent, constructive devotion, for many years to come.

A New FAA?

SPECIAL PRESIDENTIAL AIDE Edward P. Curtis has placed in the legislative hopper a broad-gauge proposal for a new independent Federal Aviation Agency which would absorb all of the CAA and a few minor functions of the CAB pertaining to safety.

We will have ample comments on his proposals in due course but suffice it to say at this time that the concept appears to be sound throughout. Mr. Curtis has done his job well. It it now up to Congress and the aviation industry to put these proposals into tangible form.

Wayne W. Parrish

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WHEN-WHERE

JUNE

National Symposium on Production Techniques, sponsored by the Washington chapter of IRE, Willard Hotel, Washington, D.C., June 6-7.

Parks College annual homecoming and reunion, East St. Louis, Ill., June 7-8.

International and Military Automation Exposition, Coliseum, New York, June 9-13.

ASME semi-annual meeting, Sheraton-Palace Hotel, San Francisco, June 9-13.

American Rocket Society, semi-annual meeting, St. Francis Hotel, San Francisco, June 10-13.

Royal Netherlands Aero Club, 6th International Air Display, Ypenburg, Holland, June 10.

Operations Research Conference, sponsored by Illinois Institute of Technology, IIT Campus, Chicago, June 12-14.

American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N.J., June 16-21.

National Convention, Military Electronics, sponsored by IRE Professional Group, Sheraton Park Hotel, Washington, D.C., June 17-19.

IAS national summer meeting, Biltmore Hotel, Los Angeles, June 17-20.

Aviation Distributors and Manufacturers Assn., annual meeting, The Broadmoor, Colorado Springs, June 23-25.

Transport Management Program, Stanford University, Stanford, Calif., June 23-July 20.

Soviet National Aviation Day, Moscow, June 24.

Federation Aeronautique Internationale, Palermo, Sicily, June 25-30.

Institute of Navigation, annual meeting, Sheraton-Park Hotel, Washington, D.C., June 27-29.

JULY

National Soaring Contest, Elmira, N.Y., July 2-11.

All-Woman Transcontinental Air Race, San Mateo County Airport, Calif., to North Phila. Airport, Pa., July 6-10.

British Lockheed International Aerobatic Competition, Kings Cup and National Air Races, Coventry Aerodrome, Bagington, England, July 12-13.

National Flying Club Convention, sponsored by National Flying Club Assn., Inc., Denver, July 30-Aug. 2.

Air Force Assn., Convention, Washington, D.C., July 30-Aug. 4.

AUGUST

IAS Naval Aviation Meeting, U.S. Grant Hotel, San Diego, Calif., Aug. 6-10.

International Ignition Conference, sponsored by Bendix Scintilla Div., Sidney, N.Y., Aug. 20-22.

Western Electronic Show & Convention, Cow Palace, San Francisco, Aug. 20-23.

SEPTEMBER

Royal Aeronautical Society and IAS 6th International Aeronautical Conference, Folkstone & London, England, Sept. 1-15.

SBAC annual air show, Farnborough, England, Sept. 2-8.

IATA annual general meeting, Madrid, Sept. 9.

ASME fall meeting, Hotel Statler, Hartford, Conn., Sept. 23-25.

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LETTERS

Historical note

To the Editor:

In your En Route page April 8 you mention the Miami Springs Hotel and Villas operated by Art Bruns. Perhaps your readers would like to know that this is the estate of the late Glenn H. Curtiss. I visited the Curtisses many times and having been there recently I entirely agree with your description. *BECKWITH HAVENS, 202 West 40th Street, New York 18.*

Editor's Note: Thanks to aviation pioneer Havens for noting an obvious omission. Many aviation old-timers will remember having visited the fine estate of the late Glenn Curtiss, who contributed so much to U.S. aviation, just north of the present Miami International Airport. Art Bruns has retained much of the beauty of the estate in his popular and conveniently-located hotel and villas operation.

Liked electronics article

To the Editor:

We are very pleased with Henry Steier's article in the March 25 issue of AMERICAN AVIATION concerning the Eimac program (page 41). Many times when a person delves into a subject in the technical manner that he did, things come out in print all mixed up. However,

it is the opinion here, without exception, that the article was done on a very high level and in a clear and concise manner . . . I would like to receive a few copies of the magazine plus 250 reprints . . . *BERKLEY J. BAKER, Advertising and Press Relations, Eitel-McCullough Inc., San Bruno, Calif.*

International statistics

To the Editor:

In your article in the May 6 edition of AMERICAN AVIATION is the statement —"The Air Transport Association believes that it is right for the U.S. carriers to earn more than foreign airlines since seven out of ten international air passengers are Americans or foreigners residing in the United States." This statement is nearly correct in ever-diminishing proportion as it relates to air passengers entering and leaving U.S. gateways. From available statistics, it is evident that it does not relate to the world's air traffic, of which the three major U.S. international flag carriers carried more than one-third.

According to figures in IATA Bulletin #23, Airline Statistics Calendar Year 1955, and U.S. Immigration and Naturalization Statistics, Fiscal Year 1956, the foreign flag carriers flew 31.5% (830,549) of the total passengers arriving and departing on international flights at U.S. gateways (2,642,934). The U.S. carriers flew 34.35% (3,211,858) of the total world air travellers (9,350,000).

The foreign flag carriers flew 1.8% more revenue passengers to and from U.S. gateways than the total number of aliens who entered and departed these gateways. The U.S. carriers apparently lay claim to all alien residents of the United States. Under these circumstances, the foreign carriers would be entitled to all U.S. citizens resident abroad. According to immigration statistic, 17% of all foreign residents travelling to and from U.S. gateways are U.S. citizens residing abroad.

From these statistics, it would appear that about 900,000 U.S. citizens departed from the United States in all directions by air. This number hardly bears out the frequently reiterated contention that 80% of all air travellers are U.S. citizens.

There are some interesting statistics in your April 22 issue. On page 41 is a table that claims that during the calendar year 1956 14,517,239 air passengers embarked, disembarked and transited fifteen major European gateways (not including Shannon, Prestwick, Lisbon, Madrid and Rome) all of which are serviced by U.S. carriers. The total number of passengers departing the U.S. for Europe in the calendar year was 318,962, The total both ways was 691,549. In other words, the foreign flag transatlantic carriers had an available market in the United States of between the two foregoing figures, whereas it would seem that the U.S. carriers would have a market of over 14 million passengers for inter-European pickups and onward hauls between Europe, Africa and Asia. Although I realize these figures are inconclusive, I think they do shed some light on the relative value of the U.S. and European international air markets. *WILLIAM TAYLOR, Assistant to the President, Scandinavian Airlines System, Inc., 1001 Connecticut Ave., N.W., Washington, D.C.*

About foreign airlines

To the Editor:

It is very seldom I write to an editor, newspaper or magazine, although I have often disagreed. However, your last issue of AMERICAN AVIATION, May 6, and some of the articles therein pertaining to air routes of foreign carriers, was the straw that overloaded my otherwise complacency.

Your editorial "Are Air Routes Foreign Aid Grants?" was read with much interest and I am in general agreement. I believe a few stronger paragraphs regarding the give-away program should have been inserted.

So much for the compliments.

On page 65 of the same edition "What Foreign Airlines Can *Expect*," the writer of this article, in my opinion, is guilty, like so many of the present-day

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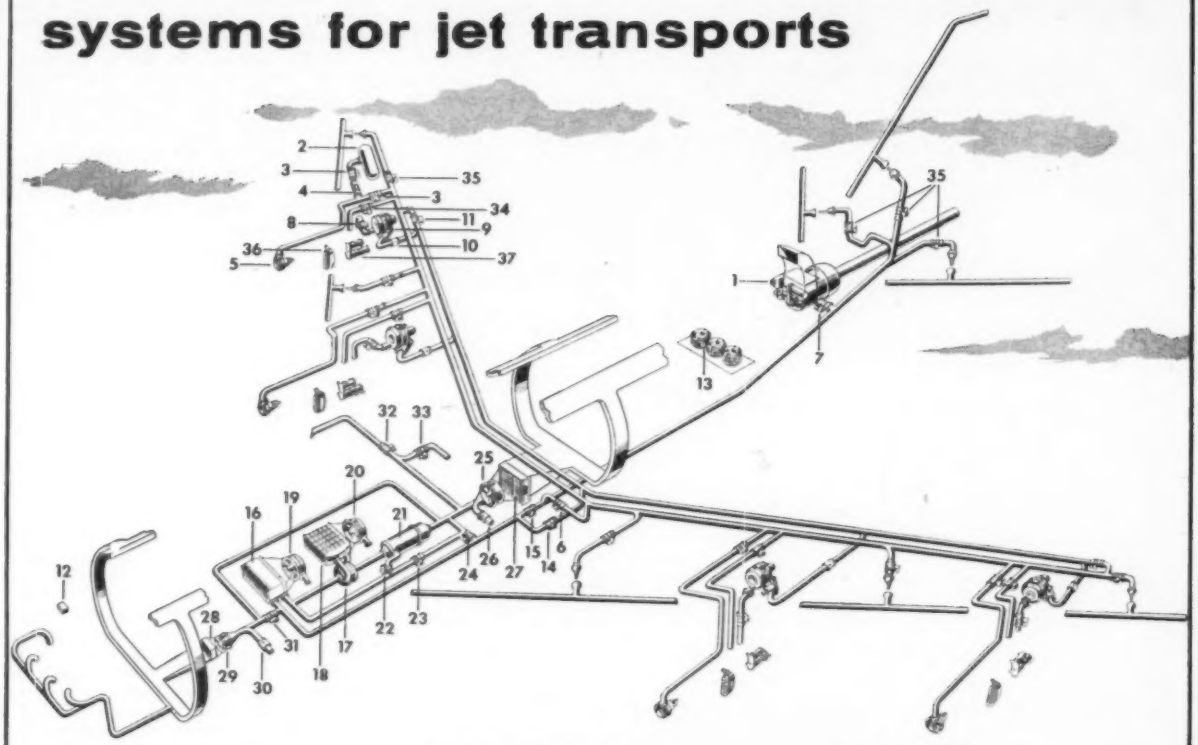

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15. GTC Air Conditioning Shut-off Valve
16. Primary Heat Exchanger
17. Bootstrap Refrigeration Unit
18. Secondary Heat Exchanger
19. Primary Heat Exchanger Cooling Air Fan
20. Secondary Heat Exchanger Cooling Air Fan
21. Water Separator
22. Water Separator Anti-icing Control Valve
23. Turbine By-pass Valve
24. Cabin Hot By-pass Valve
25. Cabin Recirculating Fan
26. Cabin Recirculating Fan Check Valve
27. Cabin Electric Heater
28. Flight Station Electric Heater
29. Flight Station Recirculating Fan
30. Flight Station Recirculating Fan Check Valve
31. Flight Station Hot By-pass Valve
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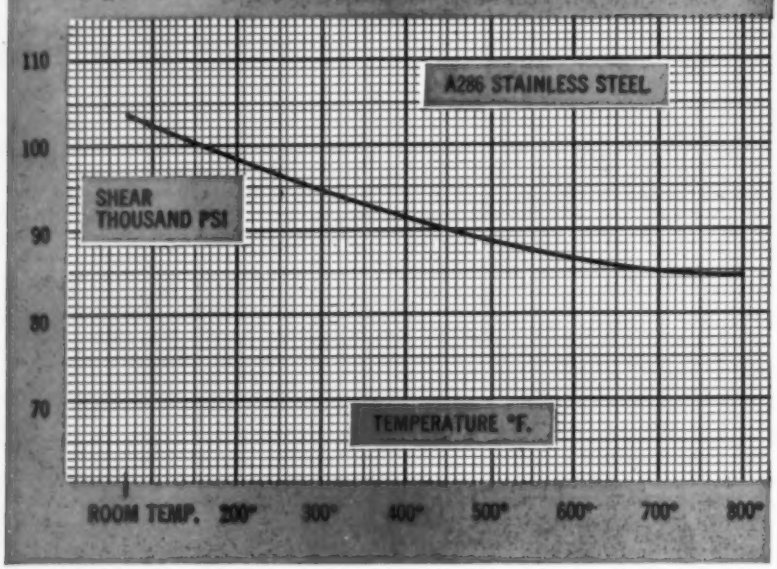

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LETTERS

reporters of half-truths. The only part of his article that I agree with is in the second paragraph " . . . has left foreign governments and carriers in the state of extreme confusion." This confusion is unnecessary and a policy of a strict reciprocal advantage should be adhered to.

There appears to be a misnomer used in these negotiations, "bi-lateral." The definition: "Two sided or two *matching* sides. Binding two parties, as to a contract or a treaty, *equally*."

The Congressional bodies of our government issue statements such as: There is no need for airline subsidies; the airlines should pay their own way; etc., etc. The executive branch of the government, not entering into this side of the question, appears to feel the foreign carriers should be subsidized, not only by their own governments but by the U.S. as well. We appear to be pouring our tax money into foreign aid which goes to the foreign governments, which in turn goes to the foreign airlines. We then give them the most lucrative traffic routes from the U.S., all to the disadvantage of the American Flag Carrier.

Your reporter in his article on page 65, does not appear to have checked his facts and merely covers up by quoting "State." "State defends its attitude . . .," "According to State . . .," etc. It appears to me it is about time the legislative branch of our federal government took a hand in stopping this give-away program. Why didn't this reporter quote ATA, CAB or individual air carriers, thereby giving a truer picture?

For approximately two years the American flag carriers have been going through lengthy and costly required legal proceedings to secure international air routes. The State Department, within a matter of weeks, gives competitive routes to foreign carriers with no benefit of contesting by domestic or international American air carriers, even though their new routes will take from both American domestic and international air carriers.

It is not understandable how BOAC, serving four lucrative air travel centers in the U.S., can block an American air carrier from extending its routes between two non-British countries. It appears the old saying, "Biting the hand that feeds you," definitely applies to the Dutch airline. In the last go-round when they had nothing to give, they secured several additional lucrative routes; and then they became quite upset because they were denied more, making the statement they would soon be back for the additional.

It would be interesting if your reporter would furnish me with the statistics to prove his quoted statement, "According to State, among carriers of the 60 nations with which the U.S. exchanges air routes, only three earn more in the U.S. market than U.S. carriers earn in theirs" unless the State Department used the loading figure out of these countries as monies earned. Whereas, actually they are American tourists who have purchased round-trips or who have travelled to Europe by surface means. Or possibly the foreign carriers have taken the American tourist to Europe and the American carrier is carrying this American tourist on the return.

The carriage of international air mail is another sore subject. It too could be aired.

Again referring to your article, it

appears your reporter could have been more factual outlining the big advantage the British have with their four air routes in the U.S. and some of the restricting regulations placed on American air carriers when operating in these various foreign countries. A few examples: In Britain, the American carrier is at the mercy of the BOAC personnel when checking in for their flights and transportation to the airport in London. The same holds true in France. I personally experienced this type of poor handling in France. At the expense of the American carrier on which I arrived, passengers thereon were delayed for one-half hour until Air France landed and its passengers cleared customs, immigration and were on their way to town.

Government regulations of these countries are dictatorial and costly to the American air carrier for doing business in their countries. The U.S. Government does not place these same restrictions on the foreign air carrier doing business in the U.S. Again, what is bi-lateral about our agreements? Turn the other cheek? No, we make it easy, we bend over (backwards).

I would also like to refer you to *Time* magazine, April 15 issue, pages 105 and 106. I quote, "Last week, faced with rising Dutch feeling the U.S. State Department decided to please a NATO ally at the risk of angering U.S. airlines." A few questions—What is the population of Holland? What did they do with their oil wells in the Dutch East Indies in World War II? Isn't that country about the size of Vermont? "Pleasing a NATO ally," phooey!

It is suggested the above referenced *Time* Magazine article be read in its entirety and analyzed intelligently.

It appears to be the responsibility of the State Department to create revenues for foreign air carriers. Does it not also behoove the legislative branch of the government to protect the interests of the American flag carriers?

As I stated at the beginning this is the first time I have felt inclined to write on something that is a gross injustice to the American free enterprise way of doing business. This trend should cease and desist. Every civic, state and federal officer should use every means of properly educating the State Department. *CLAUDE E. LEAGUE, Seattle 15, Wash.*

B-66 was an RB-66

To the Editor:

In your April 22 issue (p. 10) a Mr. J. P. Ling wrote in correcting you in identifying a Douglas plane. He was partially correct, not quite, as to it being a Douglas B-66.

Your picture readily shows it not to be a B-66, but rather an RB-66. This is quite apparent from the fibre glass structure on the vertical stabilizer.

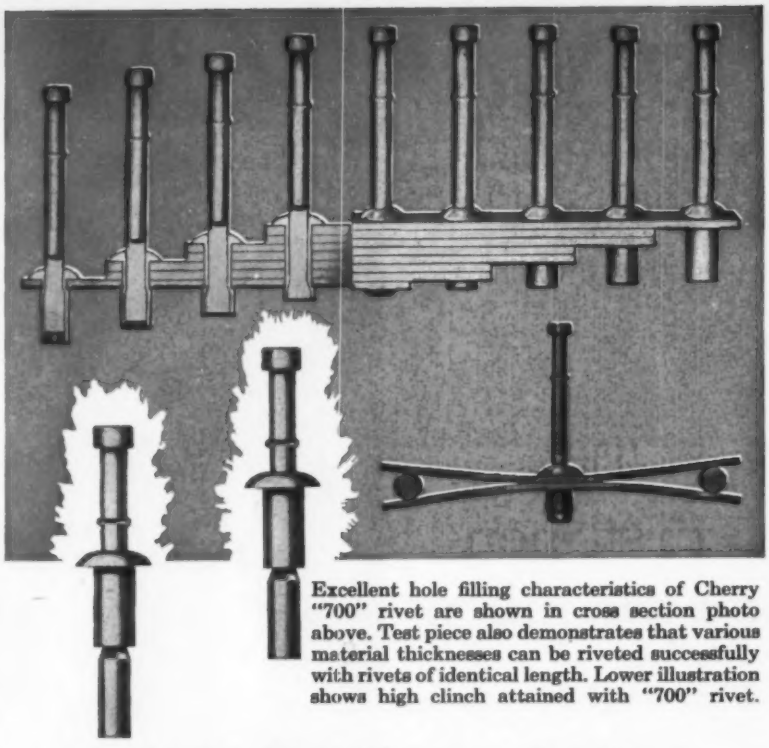
Thank you for a very interesting and informative publication. *L. C. GRAVES, Garden Grove, Calif.*

Editor's Note: Reader Graves is correct. The caption (March 11, p. 57) identified the aircraft as an RB-66C.

They like new style, too

To the Editor:

Ted Cate and I both read AMERICAN AVIATION carefully every month and this note is to tell you we like the new style and organization. *E. D. McGLONE, Cate and McGlone, Hollywood, Calif.*



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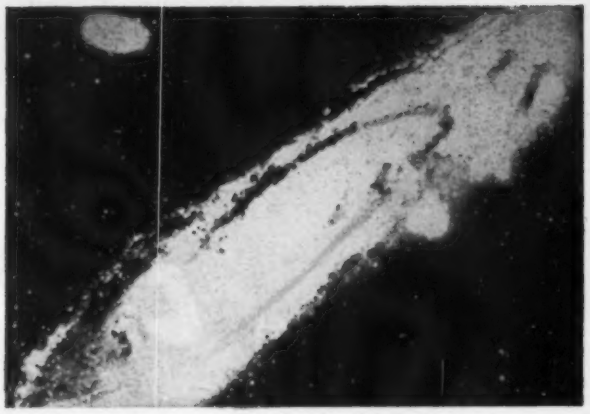
The first men on the moon

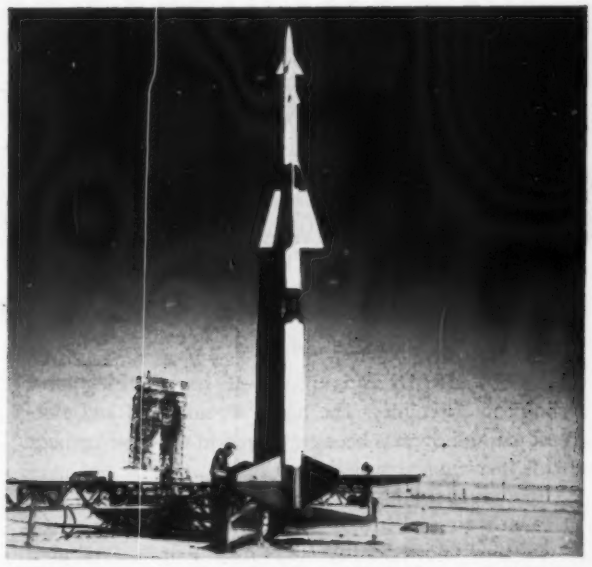
What Douglas engineers are doing to make it possible!

Space travel, a dream five years ago, is now so near reality that lunar landings are predicted by the end of this century.

This is hastened by knowledge being gained in *present* and *practical* research. For instance, when Douglas engineers find new ways for fliers to survive high gravitational pulls at supersonic speeds, they also help some future pilot survive the blast-off of a moon-bound rocket. And current studies on heat dispersion, aimed at getting an intercontinental missile back into our atmosphere without air friction burning it up, will apply to the problem of returning a space ship safely to earth.



With the possibility of interplanetary flight accepted by engineers, man now looks to outer space and is speculating on new power sources needed to get him there. A predicted break-through is the plasma engine, which will harness ions or light itself to drive aircraft nearly 186,000 miles per second.



At Douglas, a Missiles Division with the longest history in its field, is building rockets and missiles for military use. Nike Ajax (above) is already guarding principal cities, and soon the more potent Nike Hercules will be ready to take over these assignments. Thor, an intermediate range ballistics missile, is undergoing tests, and on the classified list are many other out-of-this-world projects in engineering, design and construction.

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SPOTLIGHT

Third North American Navaho test flight came to grief in mid-March when the multiple boosters quit firing after two seconds. Trouble was traced to a wild signal from within the test vehicle. The three 120,000-pound booster engines used in the XSM-64 will be replaced by a 400,000-pound liquid rocket engine now under development, if the Navaho is ordered into production.

First tryout of Navy's advanced integrated instrumentation research will be in a Lockheed T2V-1 SeaStar trainer. Project probably will include a Willy's flat cathode ray tube which is transparent for use as part of the windshield.

Navy is said to be interested in Air Force's Sperry Cytac low frequency hyperbolic navigation system (AMERICAN AVIATION April 8, p. 52) for exact position-fixing of warships carrying ballistics missiles.

An Air Force Thor IRBM was destroyed by fire four minutes before launching time at Patrick AFB last month. It was to have been the third flight test for the 1,500-mile ballistic weapon.

Record-breaking Aerobee-Hi rocket that reached 193 miles altitude recently was 175th in the Aerobee series produced by Aerojet-General. Forty-nine others have been delivered to various services, but have not been launched. An additional 33 are being fabricated for use during international Geophysical Year and for Air Force. First Aerobee was fired Nov. 24, 1947, reached an altitude of 36 miles.

Bristol Orion BOn 2 has a takeoff rating of 4,400 shp, plus 1,950 lbs. thrust.

House Appropriations Committee has advised Air Force to drop the Bell Rascal air-to-surface missile. Committee, which it said is one of several projects of "doubtful value." Committee urged USAF to resurvey its development program. Air Force now is producing or developing 18 missiles.

Lockheed has an Air Force contract to study possibilities of increasing range of the F-104A.

First operational evaluation of British Dectra long-range navaid on North Atlantic got under way May 18 when a Vickers Valiant jet bomber used system to navigate from Boscombe Downs, England, to Gander, Newfoundland, in 5 hrs. 29 mins., returning in 4 hrs. 23 mins. Pilots reported system signals as solid continuously and accuracy well within predictions. Dectra is competing with U.S.-backed Navarho navaid for eventual recognition in International Civil Aviation Organization as common global navaid.

Goodyear Aircraft Corp. is prime guidance system producer for McDonnell Aircraft Corp. in Navy Triton missile project. Firm also produces guidance for Martin TM-61B advanced Matador.

Engineering evaluation test of the advanced Hughes fire control system for Northrop F-89J is being performed at Air Force Armament Center, Eglin Field, Fla., where the aircraft also is being cold-tested. Air Proving Ground Command is conducting employment and suitability tests on this latest version of the Scorpion, which represents modifications for use of Douglas MB-1 rocket as well as the Hughes Falcon.

Ford Motor Co.'s Aircraft Engine Division has a backlog of nearly $1 billion for Pratt & Whitney J57 engines and parts. Company also is second source producer of P&W J75s.

Army is aiming at a total of 7,000 aircraft and helicopters by the end of 1961. Present inventory is about 4,000.

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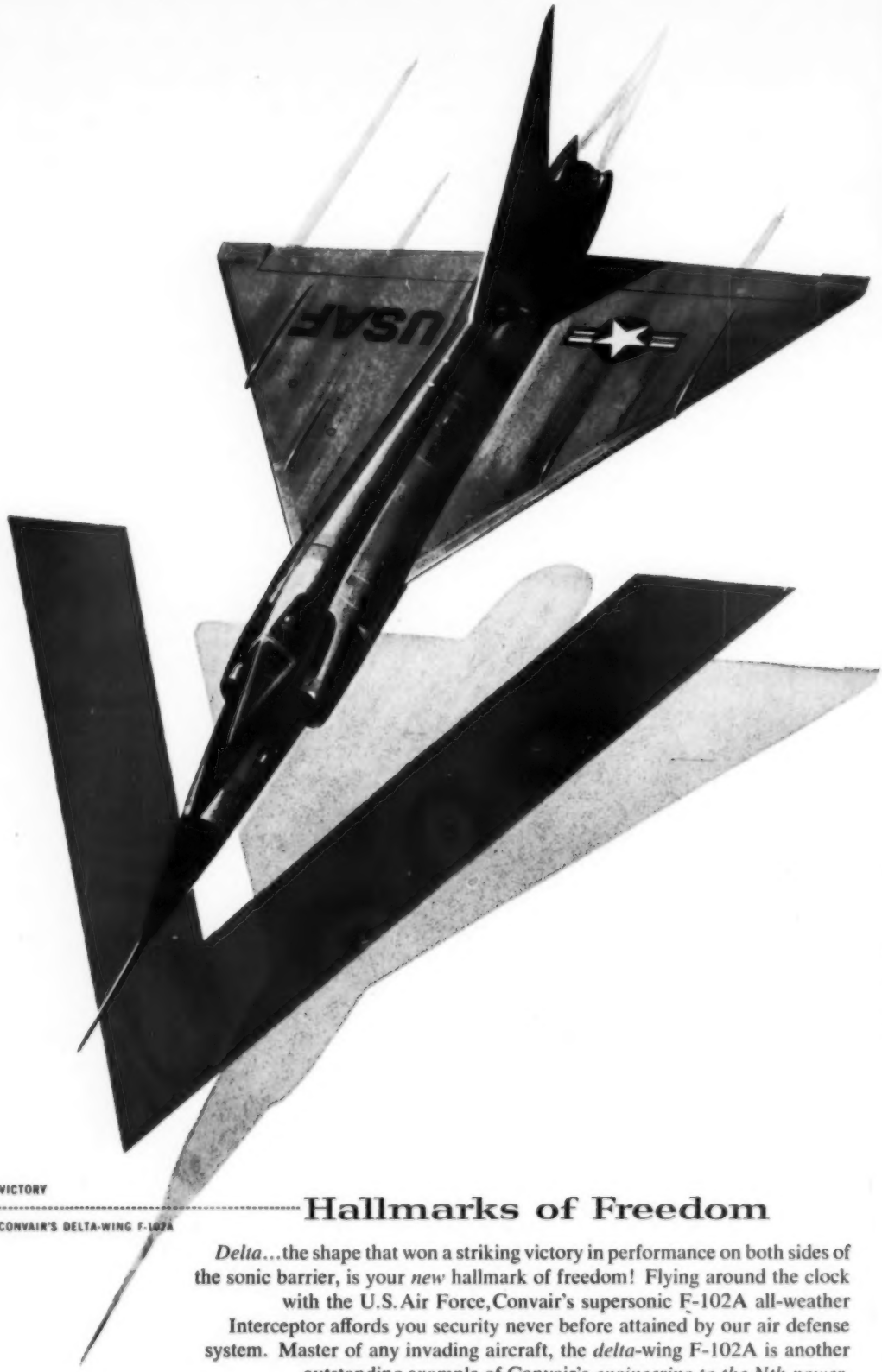

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AIRTRENDS

Military spending for aircraft and missiles continued at a torrid pace in March. Guided missiles racked up the highest monthly expenditure level recorded during the current fiscal year—$207,168,000.

Cumulative missile spending for the first nine months (July through March) amounted to $1,428,921,000 compared with the Administration's January estimate of $1,506,000,000 for entire fiscal 1957.
Aircraft spending exclusive of military assistance aggregated $5,697,653,000 for the whole year. Obviously, the final totals in these accounts will far exceed the initial estimates.

Pentagon efforts to dam the spending torrent aren't making much headway. "I am just like a frog trying to jump out of a well," Defense Secretary Charles E. Wilson told a press conference. "I make a little progress and I slide back."

Army's aircraft inventory presently stands at 4,286—including 2,494 fixed-wing aircraft and 1,792 helicopters. By mid-1958, the service expects to have a total of 6,038 aircraft either on hand or on order.

Total value of mid-1958 inventory plus orders is estimated at $489.5 million. This compares with $433.6 million for the present inventory plus unfilled orders.

Defense Department now appears to favor the Martin-Aerojet Titan intercontinental ballistic missile over the Convair-North American Atlas, despite the fact that Titan is a year or more behind Atlas in development. Commenting on ICBM picture during recent congressional testimony, Defense Secretary Wilson said: "The one we think is best" is probably "farther behind."

Swift change in distribution of military dollars between manned aircraft and guided missiles would have a sharp impact on airframe manufacturers and subcontractors (see story, p. 30). Sharp decline in new orders for manned aircraft would shrink the number of prime airframe contractors and reduce activity of engine manufacturers who have concentrated efforts on turbojets for conventional aircraft. As transition to missiles continues, electronics manufacturers can expect to reap a steadily greater share of military hardware money.

Military proficiency flying with propeller-driven aircraft got some unkind words from members of House Appropriations Committee during recent hearings. Lawmakers don't think proficiency in prop-driven machines is worth much. They griped because 2,200 of 2,800 Air Force and Navy aircraft maintained for such flights are prop-powered. They also take a dim view of "hole-boring" by the Strategic Air Command—long and expensive bomber flights on simulated nuclear raids.

DIGEST

Wilson's appeal for restoration of Defense budget cuts fails to win support in Senate

Top Defense chiefs, armed with figures supporting their version of how proposed cuts in the 1958 appropriation bill will hurt the military build-up, assaulted Senate chambers last week. Spearheaded by Defense Secretary Charles Wilson, they sought to recover $1.2 billion slashed from requested arms funds by the House Appropriations Committee.

Veteran observers, however, predicted that the Senate would grant no major increases. Both President Eisenhower and Wilson had warned that a half-billion-dollar reduction in Navy-Air Force procurement funds would weaken defense efforts.

From the floor of the House, Rep. George Mahon (D-Tex.) vigorously defended the overall $2.5-billion reduction in the $36.1-billion defense budget. The chairman of the Appropriations Subcommittee asserted that no aircraft or worthy missile program would suffer under the modest economy.

As the full House prepared to vote on the bill, Mahon's cause was boosted by a Republican defense authority.

Rep. Errett P. Scrivner (R-Kans.) said he thought the committee might have slashed even deeper into AF procurement funds. The ranking Republican member of the subcommittee handling Air Force procurement requests declared that the President was misinformed about the effect of the cuts.

He said reductions were tied to spare parts, not to the purchase of planes or missiles.

Defense Chief Wilson personally appealed to the Senate Appropriations Subcommittee for restoration of $474 million trimmed from AF-Navy new obligational authority. But his warning that Congress was "gambling with the security of the nation" left Democratic members unimpressed.

Sen. Allen Ellender (D-La.) said he thought the Air Force could absorb the proposed reductions with an estimated $2.5 billion it is expected to recoup in fiscal 1957 and 1958. Wilson's sketchy knowledge of this before the Senate unit didn't aid the Pentagon's cause, it was generally conceded.

The House was expected to uphold recommendations of its Committee. However, there was a move on early last week to restore $300 million, including $175 million for AF procurement and $50 million for Navy.

In reporting out the bill, the committee approved a combined AF-Navy request of $7,658,000,000 for aircraft and related procurement for the fiscal year beginning July 1. Figures included guided missiles and ground-handling equipment.

Air Force's portion of this was $5,846,000,000, or $354,000,000 under the Administration's request. Although the amount is $1,002,500,000 less than that appropriated in fiscal 1957, the committee termed the cut not drastic. It said the AF could operate handily on $10,424,000,000 available for obligation in the upcoming (1958) fiscal year.

The committee apportioned to the Navy $1,812,000,000 for aircraft and related procurement. This was down $120,000,000 from the budget estimate but up $79,100,000 over 1957 authority.

Overall Defense authorization of $33,541,225,000 was recommended by the committee. In the paring operation the Army sustained the largest cut, $1,225,575,000 (including $516 million in deferred procurement funds). Navy's request was slashed $685,645,000 and the committee lopped $669,280,000 from the Air Force bid. It approved $15,801,720,000, or $675,905,000 less than the service got in 1957.

Nearly half the total $2.5-billion reduction in the bill amounts to bookkeeping savings, the committee conceded.

As the Defense drama shifted to the stage in the upper chamber, service secretaries were also making strong bids for restoration of $30,000,000 in reduced R&D funds.

NAA exhibits jet trainer at Paris air show

A bid by North American Aviation to garner foreign sales for its Model 249 was launched at the Paris International Air Show. NAA displayed a large wooden model of the jet trainer which will be powered either by a Westinghouse J34 or Bristol Orpheus.

Price of the Model 249 was given as $125,000. It is a version of the T2J, now under development for the Navy at North American's Columbus Division. First Navy model will fly in December. NAA is proposing the 249 to be adaptable to any training curriculum—primary, intermediate, advanced.

Dimensions of the 249 are: Span, 36 ft.; length, 37.8 ft.; height, 14 ft.

Performance data, according to NAA, are: maximum gross takeoff weight, 9,507 lbs.; service ceiling, 41,000 ft.; maximum speed, 429 knots; stall speed, 65 knots; takeoff distance over 50-ft. obstacle, 2,900 ft.; landing distance over 50-ft. obstacle, 1,690 ft.

Seating arrangement is tandem and the instructor's seat is 10 in. higher than student's.

British fly rocket-jet interceptor

SAUNDERS ROE SR.53 single-seat fighter, powered by a DeHavilland Spectre rocket engine and Armstrong Siddeley Viper turbojet, completed its first flight recently at Britain's Boscombe Downs experimental station.

BOAC orders 35 VC 10 jets; deliveries to start in '63

British Overseas Airways Corp. has ordered 35 Vickers VC 10 medium/-long-range jets valued at more than $190 million, with deliveries to begin in 1963. It is the third jet order placed by BOAC. Boeing 707s and De Havilland Comet 4s were ordered earlier.

The VC 10 is slated for use on BOAC's Commonwealth and Far East routes. Power will be supplied by four Rolls-Royce Conway bypass engines.

Details released by Vickers-Armstrong class the VC 10 as a 120-passenger transport with high-density capacity of 147 passengers. The aircraft will have a "double-bubble" fuselage similar to that of the Vanguard and will contain large cargo holds.

The new jet will have a cruising speed "competitive to that of other aircraft scheduled to operate in the mid-1960s, and, in addition, will have especially good airport performance at high altitudes and under hot weather conditions," according to Vickers.

Sir George Edwards, Vickers managing director, said the company's decision to go ahead with the VC 10 means it will be offering a big turboprop transport—Vanguard—from 1960 onward and the VC 10 from 1963. The VC 10, Edwards said, will have superior operating economy, especially for ranges up to 1,500 miles, and will offer considerable advantages in speed and economy on routes such as BOAC's to Africa, South Africa, India, Pakistan and Australia.

President reassigns eight Air Force generals

President Eisenhower has approved reassignment of eight Air Force generals and nominated five for promotion. Among those affected are:

Lt.-Gen. Thomas Power, Air Research and Development Command chief, to succeed Gen. Curtis LeMay as commander of the Strategic Air Command and promotion to full general rank.

Lt.-Gen. Samuel Anderson, director of Defense Department's Weapons Evaluation Group, to commander of ARDC.

Lt.-Gen. Frank Everest, nominated to four-star rank, to become AF chief in Europe. Present chief, Lt.-Gen. William Tunner, succeeds General Everest as Deputy Chief of Staff, Operations.

Maj.-Gen. John Gearhart, nominated for lieutenant-general, to fill new post of Deputy Chief of Staff, Plans and Programs.

Separate spending, politics, GE president urges

General Electric president Ralph Cordiner, in his Armed Forces Day address in Washington, called for a separation of defense spending from politics and relief.

Cordiner maintained that the Defense Department must be left free to place its contracts where it can expect best results from the least investment. He charged that placement of defense contracts in depressed communities or with failing companies was too often based on vote solicitation.

Cordiner also called for greater industry incentives to reduce costs, more research and modernization rather than stockpiling, and urged adoption of Defense Committee's recommendations on compensation for armed forces personnel.

Paul Brattain retires as first VP of EAL

Paul H. Brattain, who has been in aviation continuously for 33 years and with Eastern Air Lines for 23 years, retired on June 1 as first vice president of EAL.

He will remain as a director of the company and, under EAL's retirement consulting contract for officers, will serve as consultant until 1965. He will also represent EAL on the Board of Aeronautical Radio Inc.

BRATTAIN

Brattain, widely known and highly regarded in the industry, entered aviation in 1924 as manager of the Washington office of the Aeronautical Chamber of Commerce. After serving in that capacity for five years, he became assistant to the president of Western Air Express (1929-30). When Transcontinental & Western Air was formed through a Tat-Maddux-Wae combination, he served as assistant to the president of TWA (1930-31) and was later vice president (1931-34).

From 1934 to 1938, Brattain was vice president of North American Aviation and a director and assistant general manager of its Eastern Air Lines Division, when EAL became a separate company in 1938, Brattain was named vice president and a director. He served as first vice president from 1939 until his retirement.

AAP announces promotion of three editors

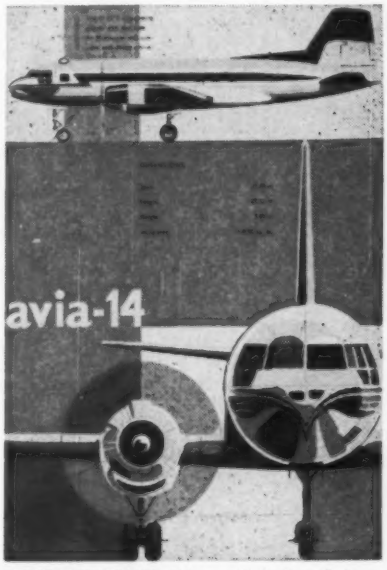
American Aviation Publications, Inc., announces three editorial depart-promotions; Eric Bramley, news editor of AMERICAN AVIATION magazine, becomes chief news editor for all publications; Erik Bergaust, managing editor of MISSILES AND ROCKETS magazine, becomes its executive editor; Joseph Murphy, technical editor of AMERICAN AVIATION magazine, becomes its executive editor, with Al Bentz continuing as managing editor. All report to Robert H. Wood, AAP's editorial director.

Wood said the promotions were made in anticipation of still further expansion of the editorial department and new services to be offered to the aviation field. AAP's new monthly magazine, AIR CARGO, will appear in July. Work will begin in the near future on next year's edition of the Aircraft Year Book, prepared by AAP for the Aircraft Industries Association.

Czechs unveil Avia-14, improved version of IL-14

PARIS—The Avia-14, a Czech-built version of the Russian IL-14 but said to have better performance than the original Soviet design, was unveiled here during the International Air Show.

The Czech version, built to comply with requirements of the International Civil Aviation Organization, is fitted with 28 seats, compared to only 18 for the Russian IL-14. However, Avia also offers two other models of the IL-14, a 24-seat layout and a 12-seat configuration for VIP service.



CZECHS USED this well-designed brochure at Air Show to illustrate Avia-14 details.

Payload of the 28-seat version is 5,605 lbs., empty weight, 27,300 lbs.; take-off weight, 38,000 lbs.; maximum landing weight, 38,000 lbs.; wing loading, 35.1 lb./sq. ft.; power loading, 9.9 lb./hp.

Performance data: Maximum speed at 7,400 ft., 256 mph; economical cruising speed at 6,500 ft., 200 mph, rate of climb at sea level, 1,200 ft./min.; service ceiling, 22,000 ft.; range of 28-seat version with 1 hr. reserve, 810 miles; takeoff distance over 50-ft. obstacle, 2,950 ft.; landing distance, 3,280 ft.

Overall dimensions: span, 103 ft. 11 in.; length, 73 ft. 2 in.; height, 26 ft.; wing area, 1,075 sq. ft.

Powerplants are two M 82 T two-row, 14-cylinder air-cooled engines rated at 1,900 hp at 2,600 rpm.

WASHINGTON TRENDS

Pentagon tightens procurement controls

Air Force materiel officials were thrown into a turmoil last week by a new Pentagon directive (No. 7200.4) which strapped tigher controls on military procurement operations.

The edict, dated May 21, appeared to be aimed exclusively at a contracting technique recently adopted by the Air Force. Known as "time-phased" procurement, this technique provides for the award of contracts for long lead-time components of an end item in advance of a quantity production contract for the item itself.

Contracts were recently awarded under this procedure to Boeing for the Bomarc interceptor missile, Pratt & Whitney for J75 engines, and International Business Machines Corp. for bombing-navigation systems.

The directive provides that no contracts be placed unless funds have been set aside by the Defense Dept. sufficient to "complete the procurement of a specified number of end items . . ." or unless money has been specifically apportioned to "complete a pre-production program or buy long lead-time components in advance of the fiscal year in which the end item itself is to be procured."

(The USAF activities that prompted the directive apparently fall within the latter category.)

The directive ordered that any procurement action "not yet wholly consummated" either be recinded or modified to conform to the new rules. "If for any reason there should be insufficient obligational authority available in fiscal year 1957 to conform all outstanding transactions to this policy, such amounts as may be necessary to do so will be a first charge against obligational authority to become available under the financial plan for fiscal year 1958," it said.

Whether the new rule will have any effect on recent AF contracts was not immediately determined, but Air Force officials are certain of one thing: future apportionment requests addressed to defense will have to be far more specific than they have in the past.

New bid for small business

Despite Defense emphasis on fewer prime contractors in military production (see p. 30), a joint Senate-House resolution has called upon the department to award at least 25% of its major contracts to small business firms.

Rep. Frank Thompson, Jr. (D-N.J.) said he was shocked to learn that 95% of all U.S. business firms received only 17% of the $12 billion in defense contracts awarded during the first eight months of the 1957 fiscal year.

Together with Sen. John Sparkman (D-Ala.), long-time proponent of small business, Thompson proposed:

1. Defense award a much higher percentage of applicable prime contracts to smaller firms to compensate for procurements which are beyond their capabilities.

2. Pentagon increase its emphasis on the set-aside program to step up utilization of small business capabilities.

Emphasis, said the resolution, should be in the R&D area.

Senators ask end to "influence"

Failure of Army and Navy to lay down stringent rules controlling dealings of former Pentagon officials working for private firms is disturbing Senate investigators.

Senate Preparedness Investigating Subcommittee made no charges of wrong-doing in citing that 108 former flag officers are now employed in industry, but stressed that there are laws for handling any illegalities.

The subcommittee simultaneously demanded that Defense Secretary Wilson issue rules designed to create a uniform "conflict of interest" policy in the Pentagon.

On the other hand, the subcommittee lauded Air Force's comprehensive regulations prohibiting one-time officials from using influence in contractual sessions. Army and Navy were urged to follow suit.

Labor maps its 1957 demands

International Assn. of Machinists is going to ask a 14 cents an hour increase this year for its members not covered by cost-of-living or escalator clauses.

Reasons IAM: "Failure to accomplish this objective would in effect, act as a wage freeze on many of our members . . ."

"We of labor must not let ourselves be talked out of our just share of increasing productivity and fair reimbursement for the recent increase in the cost of living. Wage increases to take care of these factors are the very least we can expect in 1957," said IAM president Al Hayes.

Declassification Czar named

Defense Secretary Charles Wilson has established what he calls a "Director of Declassification" for the Office of Public Information.

This has been one of the Defense projects that has held back sterner congressional criticism of Pentagon security methods (AMERICAN AVIATION, April 8, p. 16).

New declassification czar is Rear Adm. John M. Hoskins. His job: institute more vigorous action to prevent over-classification of military information.

House asks unification

A House Appropriations Committee report has added fuel to the growing demand for greater unification of the armed forces. Said the report:

Service rivalry must be substituted with a real unification of the present "loose federation." "The increasing degree of rivalry among the services for roles and missions is becoming so serious as to jeopardize and delay the rate of buildup of our military power."

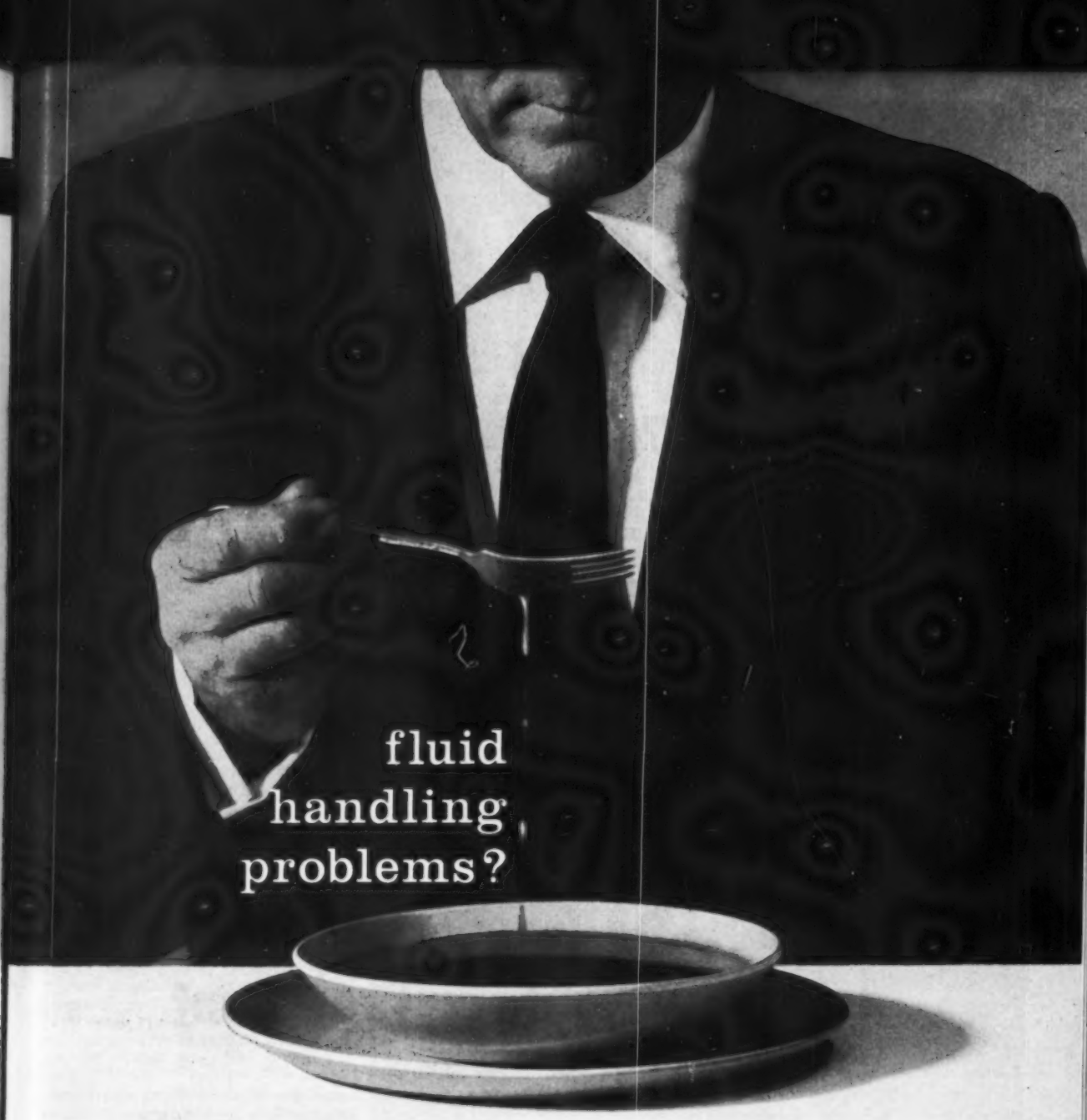
Congress weighs ending tax writeoffs

Congress is weighing legislation that would spell the end to fast tax writeoffs, except for strictly military items.

Gordon Gray, director of Office of Defense Mobilization, told the Senate Finance Committee he is not violently opposed to the bill, but urged amendments to permit rapid amortization on facilities to produce all types of military goods instead of just new types as provided in the proposed legislation.

Air Transport Assn., meanwhile, told the Senate committee the program should be continued as it applies to civil air transports. Under the proposed legislation, ATA says, new jet transports would not be eligible for rapid amortization, yet they are directly connected with the national defense.

Sen. Harry Byrd (D-Va.), committee chairman, is pushing the legislation, claiming the program has cost the U.S. Treasury millions in lost interest.



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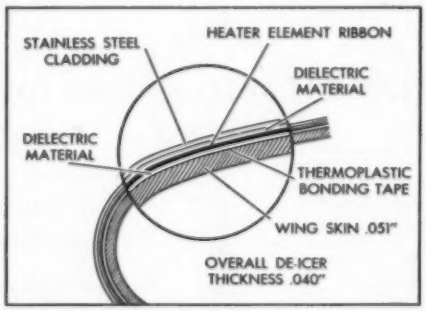
Stainless steel De-Icers for Boeing KC-135 are lightweight, hail resistant

Boeing engineers wanted a dependable, lightweight system for heating the leading edge of the KC-135's giant stabilizer. Piping bleed air from the engines would have required heavy ductwork. Installing a blower in the tail would have added even more weight and taken up valuable space as well.

A new stainless steel De-Icer developed by B.F.Goodrich Aviation Products solved the problem of weight and space. In addition, the new De-Icer resists abrasion and erosion from rain and hail.

The new lightweight, metal-clad De-Icer (right) has ribbon-type electrical heating elements sandwiched between layers of resin-impregnated glass fabric, topped by an exterior skin of stainless steel. Pre-shaped to fit the contour of the 35 foot leading edge, the De-Icers are installed in 6 sections, attached with an adhesive bond.



In addition to stainless steel, these new De-Icers can be clad with other metals of various thicknesses and designed with power densities to meet specific requirements.

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AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Materials breakthrough . . .

New ductile ceramic, vastly superior to stainless steel, could revolutionize airframe, engine designs, USAF says

An AMERICAN AVIATION *exclusive . . . by William Beller*

A FUNDAMENTAL BREAKTHROUGH in the materials field occurred in April at the University of California. A crystal of a refractory ceramic, magnesium oxide, was made ductile. This means that a new structural material vastly superior to stainless steel in strength and heat-resistant properties has been created.

One Air Force scientist put it this way: if you drop a ceramic cup, it breaks; if you drop a ductile ceramic cup, it does not break, it bends and absorbs stress as a metal would.

This development could amount to a revolution in powerplant and aircraft design. In view of the high strength and temperature-resistant properties of refractory ceramics, they could be used in their ductile form as structural materials for combustion chambers, nozzle vanes, and turbine wheels and buckets.

Because combustion chambers using ductile ceramics would no longer have to be serviced by cooling devices, turbojet complexity could be greatly decreased and reliability increased. Along with these advantages could come an increase in turbine efficiencies and an overall lowering of engine weights.

Benefits could be extracted from the chemical inertness of ceramics by using their ductile crystals to build rocket engine throats, exhaust nozzles, gas generator nozzles and nozzle blocks. The new materials could also be invaluable as sealant rings for high-pressure gas turbines for rocket engines and for auxiliary power packs.

If certain airframe structures were made of ductile ceramics, the reentry problem confronting high-altitude vehicles could be appreciably lessened. Most ceramics are also good dielectric materials. Therefore the ductile crystalline versions could be desirable for radome construction.

Credit for developing a ductile refractory ceramic goes to University of California researchers professor Earl R. Parker, metallurgy; professor Joseph A. Pask, ceramic engineering; and assistant professor Jack Washburn, metallurgy.

The Air Force Office of Scientific Research (Air Research and Development Command), through its chief of solid state sciences, Charles Yost, administered and paid for the work.

Early last month, AFOSR learned through a letter from Parker that the ductile ceramic project had met with high initial success. Parker wrote that his group had been able to deform single crystals of magnesium oxide (melting point, 5,072°F) at room temperature. He said that "no tricky techniques were involved—the crystal was loaded as a simple beam and bent through a substantial angle without fracture."

Parker told AFOSR that his group expects to make rapid progress during the next few months in acquiring basic knowledge about the new material.

Accompanying Parker's letter was a jewel box that contained one of the first group of magnesium oxide crystals that had been bent in air at room temperature.

When this crystal was shown to this writer, Yost urged him to treat the accomplishment conservatively, pointing out that much basic data about the new material is not known.

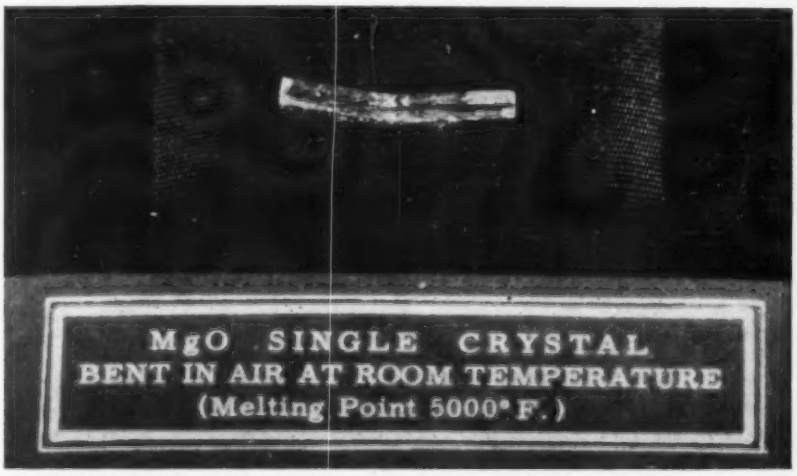
A few moments later Yost said that when he received Parker's letter he almost ran down the corridors of AFOSR yelling "Eureka!" Yost hastened to add, "But remember, this is only the beginning and quite preliminary."

Parker himself surprised

Parker told AMERICAN AVIATION that the early success came as a complete surprise. At the beginning of the project, he had unofficially estimated that it would be at least 1958 before he could report significant results. This fact is evident in the modest contract that was given to him.

The initial contract, which was awarded only last fall, had a $36,000-per-year price tag. AFOSR is now doubling the rate of effort, having allocated $55,000 for a current nine-month program. Next year the rate of effort will again be increased to $100,000 per year.

It is probable that AFOSR's ductile-ceramic bandwagon will soon have to accommodate passengers from the other military services. This could lead



DUCTILE MAGNESIUM OXIDE CRYSTAL sent to Air Force Office of Scientific Research is about one-half inch long.

to a crash program on ductile ceramics and a tight security blackout.

Making a ductile magnesium oxide is in itself unimportant. What is important is that a refractory oxide crystal has been made ductile. The next big advance will be made when the polycrystals are made ductile. Parker is concerned with this problem as well as the problem of rendering refractory oxides amenable to production operations such as rolling, casting and machining.

Yost estimates that within the next three to five years ductile ceramics will be made available commercially.

A measure of the importance of ductile ceramics is contained in an observation made by the chief of metallurgy in one of the military services. He recently dismissed the possibility of devolping such materials by calling them "dream stuff."

The objective of Parker's group was to study the properties of high-temperature ceramic materials to (1) determine the fundamental cause of brittleness of such materials, and (2) attempt to induce some degree of ductility in certain of these normally brittle materials. These men based their hopes on the following facts:

(1) Sodium chloride, which is normally brittle at room temperatures, becomes ductile when immersed in unsaturated warm water and deforms plastically in a manner similar to a metal.

(2) Ice can be made ductile, and it was by U. of C. scientists. Experiments with small cantilever blocks, 5/8" x ¼", showed that the surface condition of a normally brittle material can have profound effects upon the mechanical behavior of such materials.

This fact is probably one of the more important ones to arise out of the ductile ceramic study. It touches the fundamental cause of brittleness and perhaps shows the way to its reduction. The fact indicates, for example, that brittleness may not be an inherent characteristic of all non-metallic inorganic compounds.

Why ductility may be induced merely by changing a substance's surface conditions is only partially known. It has been a much neglected part of materials research. Such a study could lead to amazing results not only for non-metallics but also for metallics.

At the U. of C., Aerosol OT, which reduces surface energy, was added to an isopentane bath (a hydrocarbon) in which the ice was tested. It was surprising to find that, with the reduced surface energy, the ice became tough and ductile rather than weak and brittle.

Parker reported that the cantilever ice specimens "flowed plastically and bent like a metal." He added that these specimens did not crack or break even though they were bent through an angle of 15 degrees.

The investigators chose magnesium oxide and calcium oxide for their initial studies. These were picked because of their simple crystalline structure, which is essential for plasticity, and because of their refractory characteristics.

The major experimental problem was in providing facilities for melting and casting the refractory compounds. The normal means for making ceramic bodies from refractory oxides, namely by compacting and sintering, were inadequate because of the voids remaining in the sintered compacts. The voids act as centers of stress concentrations, and have internal surfaces that cannot be reached to be treated by surface active agents.

Because of these voids, pressed and sintered metals have low ductility. This is the reason why present ductile ceramics are expected to have physical characteristics far superior to those ceramics developed previously.

An electron gun vacuum-type furnace was built at the U. of C. in order to maintain composition control of the materials. It was estimated that deviations of the order of 0.01% in composition from the stoichiometric value could hopelessly embrittle an oxide compound.

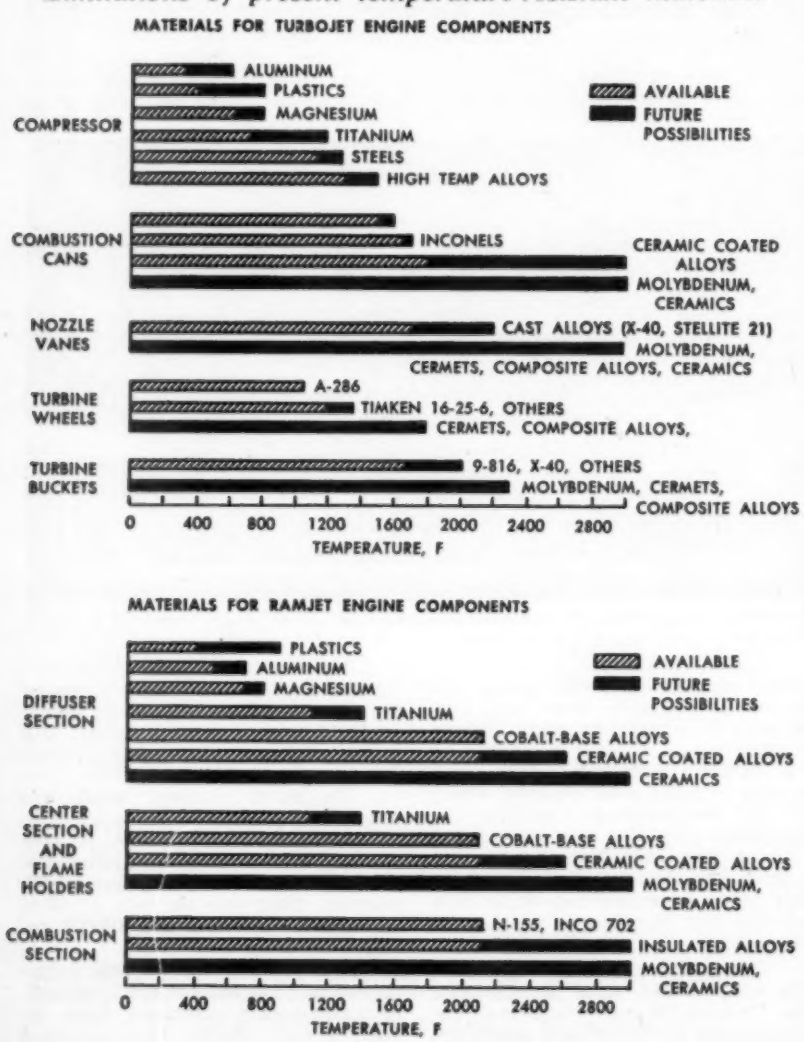
Heating by electron bombardment is a relatively new process. It is based on the principle that X-ray tube anodes become very hot when bombarded by low electron currents moving at high speeds. This idea has been used by several laboratories, particularly for the floating-zone melting of solids.

In such a set-up, tungsten and rhenium have been melted and re-crystalized. The system, of course, requires a good vacuum for its operation.

For the U. of C. work, the oxide was melted in a crucible of the same material but cooled at the outer surface. In this way, the presence of foreign atoms, which can also greatly reduce the ductility of a metal, was minimized. Parker has not yet revealed the surface treatment of the oxide after its growth.

There were strong reasons why AFOSR sponsored Parker's work in fundamental research. They realized that the performance of modern air-

Limitations of present temperature-resistant materials



craft and missiles is almost entirely dependent on obtaining temperature-resistant materials.

Despite this need and the expenditure of many millions of dollars on alloy development programs, the work has been virtually fruitless. During the past 15 years, gas turbine operating temperatures have risen only about 200°F instead of the thousand or so degrees that technological progress demanded.

The explanation is that the relatively low melting points of metals put an early upper limit on their usefulness. If metals are inadequate above 1,700°F, AFOSR asked whether there was a possibility that refractory ceramics could somehow be made usable.

These materials are strong at high temperatures, but had what was thought to be an inherent limitation, brittleness. Present ceramics suffer so much from this deficiency that they are useless for gas turbine materials.

The attempt to join ceramics to metals, thereby obtaining the best qualities of each, has in general brought out only the worst traits of each material. Cermets, the name given to the mixture, are brittle and only slightly stronger than metals.

The plight of aircraft and powerplant designers was clearly brought out at a recent Society of Automotive Engineers meeting where one speaker said that, because of the heat limitations of organic compounds, "non-metallic inorganic materials must be considered as replacements."

He recounted the years of reliance on metallic structural alloys whose ductility was needed to overcome the significance of flaws and other stress risers present in these and other complex materials.

	Aluminum Oxide Al_2O_3	Beryllium Oxide BeO	Magnesium Oxide MgO	Zirconium Oxide ZrO_2	Thorium Oxide ThO_2	Stainless Steel
Melting Point (degrees fahrenheit)	3659	4622	5072	4851	5882	2575
Density (lbs./cu. in.)	0.143	0.109	0.129	0.201	0.350	0.285
Hardness (diamond = 10)	9	9	6	6.5	6.5	5
Mean Coefficient of Thermal Expansion						
Temp. Range (degrees fahrenheit)	68-2876	68-2552	68-2552	68-2192	68-2552	32-1800
($\times 10^{-7}$/°F)	44.5	52.9	78	30.6	52.9	112
Thermal Conductivity						
Temp. (degrees fahrenheit)	2192	2192	2192	2192	2192	1500
BTU/hr./sq. ft./in/°F	16.6	47.1	17.8	6.4	N.A.	185
Ultimate Tensile Strength						
Degrees Fahrenheit	1472	1652	1472	1472	....	1600
psi	34200	7000	16000	16000	N.A.	14000
Degrees Fahrenheit	2372	2372	2372	2372	....	1800
psi	6400	600	6000	10200	N.A.	5000

N.A. = Data not available.

PHYSICAL CHARACTERISTICS of sintered refractory oxides as compared with stainless steel. (Strengths shown for sintered oxides are inferior to those expected for ductile oxides.)

It appeared to this speaker that ceramics offered the only solution. He suggested that the brittleness characteristic be overcome by pre-stressing the structure in compression. This is a technique that has gained wide acceptance in concrete structural design.

The use of a pre-stressed ceramic wing from a weight standpoint may seem most undesirable. However, based on work conducted abroad, the weight penalty compared with steel would be no more than 10% in a highly loaded structure. Such a pre-stressed structure would also offer significant advantages in rigidity as well as in cost.

Most of the ceramic oxides are unexcelled in stability in oxidizing atmospheres. As a result, these oxides are used almost exclusively where oxidizing conditions at high temperatures are involved.

There are 24 elements that form simple oxides having melting points above 3,100°F. There are also scores of more complex oxides having equally high or higher melting points, ranging beyond 5,000°F.

These oxides are used as protective coatings on the surface of metals such as steels and their alloys, and aluminum. The coatings protect the base materials against erosion and insulate thermally. Advanced experiments with such coatings show good protection in the temperature range between 1,400°F and 2,200°F.

Because pure oxide coatings are relatively new, there is not much long-term data about them. Still, one experimenter has demonstrated that a coated surface will withstand repeated blows of a hammer and the impingement of a welding torch flame until a temperature over 3,600°F is reached.

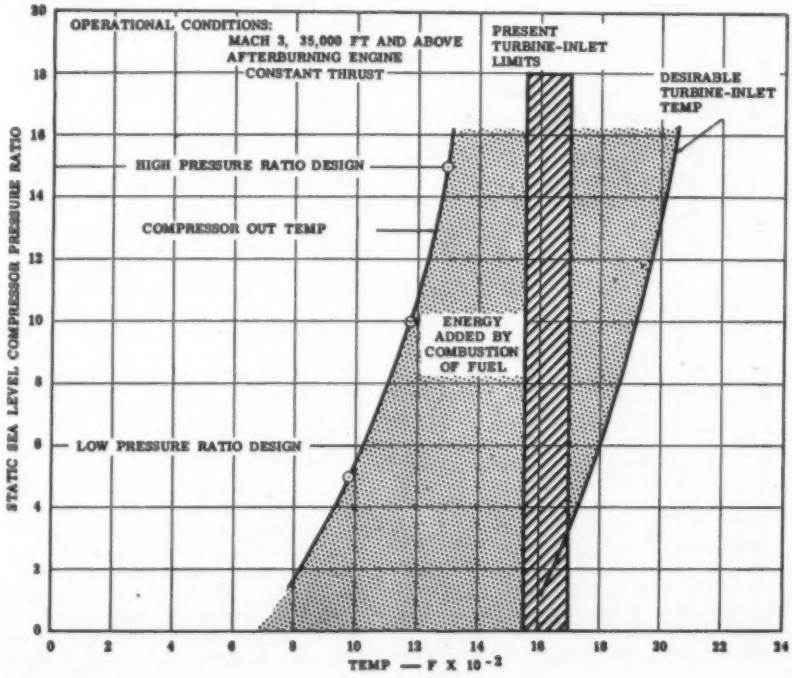
Because refractory oxides have lower thermal expansions, thermal conductivities and densities than steel, while the melting points of the oxides are higher, the materials are superior to steels in resisting the erosion and corrosion of combustion gases.

The low thermal conductivities effectively make the oxides an insulator. Since the densities of several oxides are less than steel and since their relative strength is higher, an excellent strength-weight ratio can be expected.

With the melting points of oxides being higher than steel and the hardnesses several times those of steel, the oxides will not be worn away or melted by rapidly moving gases.

When ductile refractory oxides appear on the market, it is safe to predict that the materials will be basic in the design of all high-speed, high-altitude vehicles.

MORE ENERGY can be extracted from fuel if gas-turbine inlet temperatures are permitted to rise.



Gen. Baker warns: level-off ahead

by Lois C. Philmus

THE AIRCRAFT INDUSTRY is pondering some bad news: in less than two years, its volume of activity will be cut in half, despite the fact that funds for aircraft, missiles and related items are expected to continue at the current high level.

The grim forecast of the industry's future came from several sources, but probably the most definite was the appraisal of Maj. Gen. David H. Baker, Director of Procurement and Production for the USAF Air Materiel Command. It was Baker who gave the first official Air Force warning last year of the growing threat of "over-facilitization" to airframe manufacturers.

Baker warned that the swift transition from manned aircraft to missiles will have a decisive impact on the present character of the aircraft industry. The vast capability of the new systems will reduce numbers required, while the ever-growing complexity of new weapons will boost their unit cost. The result, said Baker, will be a contraction in the number of prime defense contractors and a reduction in activity by subcontractors, despite the expectation that total military dollar support for air weapons is expected to hold a fairly constant level for the next several years.

Here's how Baker put it:

"The technological revolution in air weapons has taken place and is rapidly progressing. These advances, grounded in military necessity, will change significantly the scope and character of our industrial structure over the next several years. Most importantly, the company and industry composition of this structure may shift radically unless each participating member recognizes what is happening and adapts and adjusts to the changing requirements for his future role."

Baker's speech and a check of USAF and Navy officials by AMERICAN AVIATION showed:

1. There will be fewer weapons systems and fewer prime contractors. The decrease in airframe deliveries will start late in 1958 and hit a low level-off in 1959 and last through at least 1962.

2. Airframe and structural parts subcontractors will find a progressive lessening requirements for their services, with the prime manufacturers producing their own airframes and structural parts to keep minimum facilities going and their technical staff active.

3. Electronics will take up the slack, as airframe manufacturing requirements and aircraft bases shrink. But electronic and other specialized industries are strongly urged to make definite plans to work within the weapons systems manager concept.

4. Fewer prime contractors will mean that some present USAF major contractors will play a lesser and supplementary role to others.

The statistics that will bring about the new industrial pattern are:

Present USAF airframe and missile frame monthly delivery rate will be reduced 50% in 1959. Present rate of five million pounds per month of airframe and missile frame weight will hit a temporary peak of about 6.5 million pounds in the first part of 1958, but will then drop to 2.5 million pounds.

Present facilities utilization by USAF contractors is 40 million square feet of the available 60 million square feet of space. In the level-off period, utilization will drop to 20 million square feet of the available anticipated 70 million square feet, leaving a whopping 50 million square feet idle.

Navy, too, plans a definite reduction in manned aircraft procurement. The reduction pattern appears to be established. In 1956, the naval aircraft procurement program was for 1,639 airplanes. In fiscal 1957, this went down to 1,412. The fiscal 1958 program is for 1,220 new airplanes. The fiscal 1959 program, if it follows the present ratio, will be down to between 900 and 1,000 manned aircraft. The procurement program is based on a goal of 85% modernity. The fiscal 1958 program will bring the Navy up to 78%. After the modernity goal is achieved, the procurement plan calls for leveling off with replacement aircraft.

Actual deliveries, based on previous year funds and the fiscal 1958 program according to appropriations testimony, will drop from 2,123 in 1958 to 1,701 in 1959 and 509 in 1960 plus initial deliveries under the 1959 schedule.

It is obvious, a Navy man observed, that as we reach an irreducible minimum the main contractors will take over. Subcontractors will be eliminated, followed by a greater concentration with fewer prime manufacturers.

To date, USAF is the most definite and articulate of the services. First, USAF Headquarters Procurement and Production Director—Brig. Gen. W. A. Davis—told Congress: "The 1958 budget will reduce the production output of essentially all of the Air Force prime contractors, or will reduce their effort essentially, in the order of magnitude of 40 to 50%."

Davis later told AMERICAN AVIATION that USAF funds for aircraft and missile procurement are expected to remain stable. But the distribution of the funds will change, with manned aircraft dropping sharply and missile deliveries increasing.

General Baker told the Society of Business Magazine Editors in Washington:

"The industry most likely will be providing a declining number of manned aircraft systems for the operational inventory turnover. However, we will be able to deliver more destruction or to provide more firepower with fewer aircraft. A contributing factor to the fewer number of systems will be their increasing complexity. Because of the influence on cost of increasing complexity, we must have major advances in performance to justify replacement of inventory aircraft. We will not be able to consider new systems that do not add significantly to our striking or defensive power."

Fewer systems, he said, will mean fewer number of prime contractors. As missiles reach functional maturity and quantity production, USAF decision on where manufacturing will be performed will be based largely on cost. Advantages of production economies, tighter engineering and production coordination and faster responses

Military aviation expenditures for nine months total nearly $6.8 billion

Military expenditures for aircraft, missiles, drones and related equipment during the first nine months of the current fiscal year total $6,793,000,000, according to a Department of Defense tabulation.

March spending totaled $771 million, including $582 million by the Air Force and $189 million by Navy. Cumulative spending during the July-March period were $5,276,000,000 by Air Force and $1,517,000,000 by Navy.

New contracts placed in March total $1,024,000,000, including $953 million by the Air Force and $70 million by Navy. Cumulative obligations during the nine months totals $7,809,000,000. Of this $6,127,000,000 is for Air Force, $1,681,000,000 for Navy.

to change in a new integrated facility will be weighed against the cost of duplicate overhead structures.

"We simply cannot afford to support double cost structures," Gen. Baker said.

He specifically pointed out two major areas of concern to industries supporting weapons systems contractors. Impact of reduced total volume and of missiles technology on (1) structural parts producers for prime weapon contractors; and (2) the specialized equipment industry producing major sub-systems and equipment for the weapons.

In the first area of subcontracting, he said: "It must be recognized that as total volume of work declines in the prime contractor's plants, there will be a strong motivation by the prime contractor to restrict the off-site production under his control."

Gen. Baker estimated the volume of this work at 30% of the total program and warned that it will be an important volume of business to the primes with which to support their skilled and technical payrolls.

"Since the products involved," he continued, "are of the primes' own engineering and design, their manufacture is generally compatible with the prime's production capacity." Missile-wise, "a great deal less airframe subcontracting for off-site production may be necessary for their manufacture" because of the missile's very nature.

In the area of electronics and accessories production, Gen. Baker urged that the specialized industry's 'wait and see' attitude toward working with prime weapon systems manufacturers be eliminated.

"The trend to fewer systems and fewer prime contractors," he warned, "should be examined closely by these people and appropriate plans and action taken or they may find themselves precluded from the future systems markets."

The weapons system concept and its implementation have been both misunderstood and misinterpreted by many members of the industry, he charged. "The fact that we have placed the primary responsibility for integrating the development of a complete weapons system upon a single contractor has led to distorted and invalid conclusions as to both Air Force intentions and the impacts on industry."

He denied that the USAF is building an integrated 'munitions' industry comprised of its aircraft and missiles prime contractor. Rather, he said, we give the weapons system contractor more and more responsibility for specifying what must go into the new system and for integrating engineering and development effort for the system.

"The utilization of skills and capabilities existing in other companies and industries is an essential requirement of this concept," he asserted.

The misapprehension that production responsibilities will follow development responsibilities is invalid, he said. "It is at this point that we step in and establish a prime contract relationship with the firm which has developed the major subsystems or equipment. Participating companies for major equipments and subsystems will come into a prime contract relationship when production quantities are required."

AMERICAN AVIATION learned that Gen. Baker warned the industry that Air Force will not tolerate the absorption of electronic companies by aircraft corporations. He reportedly revealed that one such transaction slipped by, but that it would not be sanctioned again.

However, the fast-growing emphasis on electronics and de-emphasis on airframes is a recognized force. All but a small number of major aircraft companies have set up and are building up effective electronic departments. Top industry leaders feel that eventually any distinguishing lines between aeronautics and certain electronics will be obliterated and they are preparing for that day.

The Air Force, however, does have some very potent weapons at hand to control any overfacilitization. It can easily force companies into eliminating excessive facilities and prevent building of unneeded production space through the simple expedient of eliminating overhead costs in production contracts. This, in turn, will deeply cut into subcontracting.

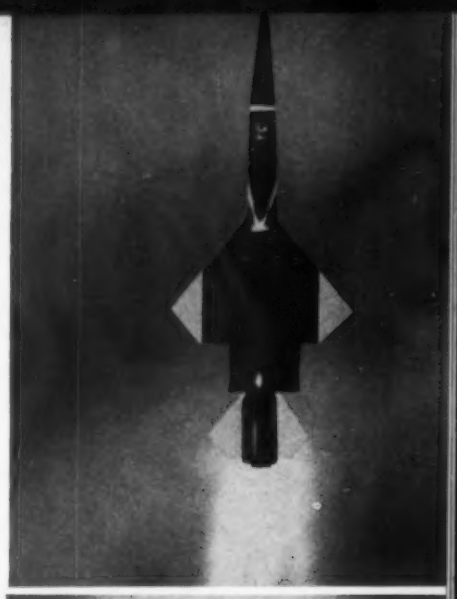
Air Force influence on company facilities has already been exercised with the Boeing Airplane Co. Boeing's plans for setting up Bomarc and other missile production areas in California were dropped. Air Force officials admit it was on their "advice" after finding that facilities in Seattle and Wichita were adequate.

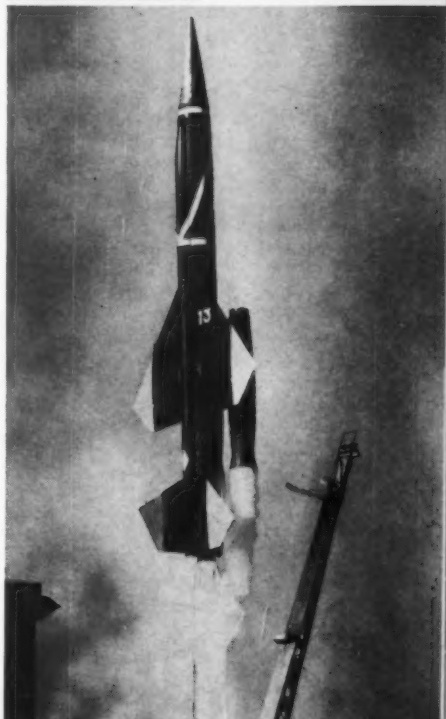
Industry itself is showing signs of awakening to the impending retrenchment. Temco Aircraft Corp., probably the largest airframe subcontractor in the country, recently announced a five-year plan. It calls for Temco to build up its prime missile and electronic business to the point that it accounts for 50% of its present total sales.

Other indications of the squeeze on recent major USAF contractors:

North American Aviation earlier this year announced that 450 employes would be laid off at its Columbus Division by April 1 with more extensive reductions late in the summer. While this may be a temporary condition until full production starts on the Navy's T2J jet trainer, NAA has taken aggressive measures to fill in the gaps. It has established a separate maintenance and overhaul department and has accelerated efforts to get some subcontracting work.

An undisclosed number of layoffs were effected following the "reorientation" of the Navaho missile program. There will further be a wide gap between production phase out of the F-100 and the development of the new long-range interceptor for the Air Force. On the other hand, the com-





Bomarc in action

VERTICAL LAUNCHER falls away, left as rocket engine lifts Boeing IM-99 Bomarc into air on test flight at Patrick Air Force Base, Fla. Two ramjet engines mounted under body take over after suitable speed has been reached and rocket cuts out. Boeing has been awarded production contract for missile, which will be assembled at Seattle. Aerojet General Corp. builds liquid fuel rocket engine, Marquardt Aircraft Co. makes the ramjet.

pany's Rocketdyne division is building up rapidly and effectively.

Republic Aviation Corp. announced it would drop 4,000 from its payroll by June 1. The F-84F production cycle will be concluded in August. Full production support for the new F-105 fighter-bomber is not scheduled until late in 1958.

Martin Co. recently effected some layoffs as a result of the USAF cancellation of the TBX bomber project. Its Navy SeaMaster program is slowed down, pending completion of the tail fix and no funds were requested in fiscal 1958 because of the delay.

Several other major contractors are in a middle ground with contracts for aircraft production and R&D on missiles carrying them through for the present.

However, Convair and Boeing appear to be emerging as the two major and strongest military aircraft contractors. Convair has firm production contracts for the F-102, F-106. Its B-58 supersonic bomber program is coming along beyond Air Force expectations. It is the prime contractor on the Atlas ICBM, which is ahead of Martin's Titan in the development race.

Boeing is assured of its 603 B-52s plus the accelerated production of its KC-135 tanker. First Bomarc production contract was announced and it is expected to hit up into the hundreds of millions in the next 12 months.

Many industry representatives have told AMERICAN AVIATION they are not sure what their individual positions are officially. Earlier in the year, USAF spokesman maintained former AF Secretary Donald Quarles intended to brief major USAF contractors on their individual futures. The new Air Force Secretary, James Douglas, has made no such announcement. But a check of companies reveals that only about two have received such briefings.

Apparently, pressure on the Air Force is needed to push this program through. While the recent frankness is appreciated, individual companies cannot take advantage of the advice to prepare now for the belt-tightening, unless they learn just how many notches to take up.

Industry backlog for 1956 up 17% over 1955

Backlog orders reported by manufacturers of complete aircraft, engines and propellers stood at nearly $18.4 billion December 31, up 17% over 1955's figure, according to statistics of the Bureau of Census and Civil Aeronautics Administration.

Complete aircraft orders totaled almost $11.8 billion, 10% above the figure of a year ago. At the end of 1956, orders for U.S. military customers represented 67% of the backlog for complete aircraft, engines and propellers. Total backlog was about twice the value of sales for the year.

Total new net orders received during 1956 amounted to nearly $12.2 billion, as compared with $9.3 billion during 1955. Net new orders represented 66% of the total year-end backlog, compared with 59% at the end of 1955. This represents a 12% increase from sales of $8.47 billion in 1955.

Because the value of subcontracts is reported both by prime contractors and subcontractors (if both are airframe producers) there is some duplication in the figures given in the study for value of backlog, new orders and net sales of complete aircraft and parts.

As measured by major subcontracts let by airframe producers to other airframe producers, duplication in the value of backlog orders amounted to $308 million at the end of the year, compared with $272 million in 1955.

Air Force and Navy contracts for engines and propellers are made directly with manufacturers, avoiding duplication in those categories.

Army seeking funds for rebuilding Nikes

Army is looking for money to rebuild some 4,000 Nike missiles in fiscal 1958, according to House Appropriations Subcommittee testimony.

Corrosion and deterioration of parts from exposure and repeated testings were cited as reasons why the rebuilding program is necessary. No specific costs were mentioned.

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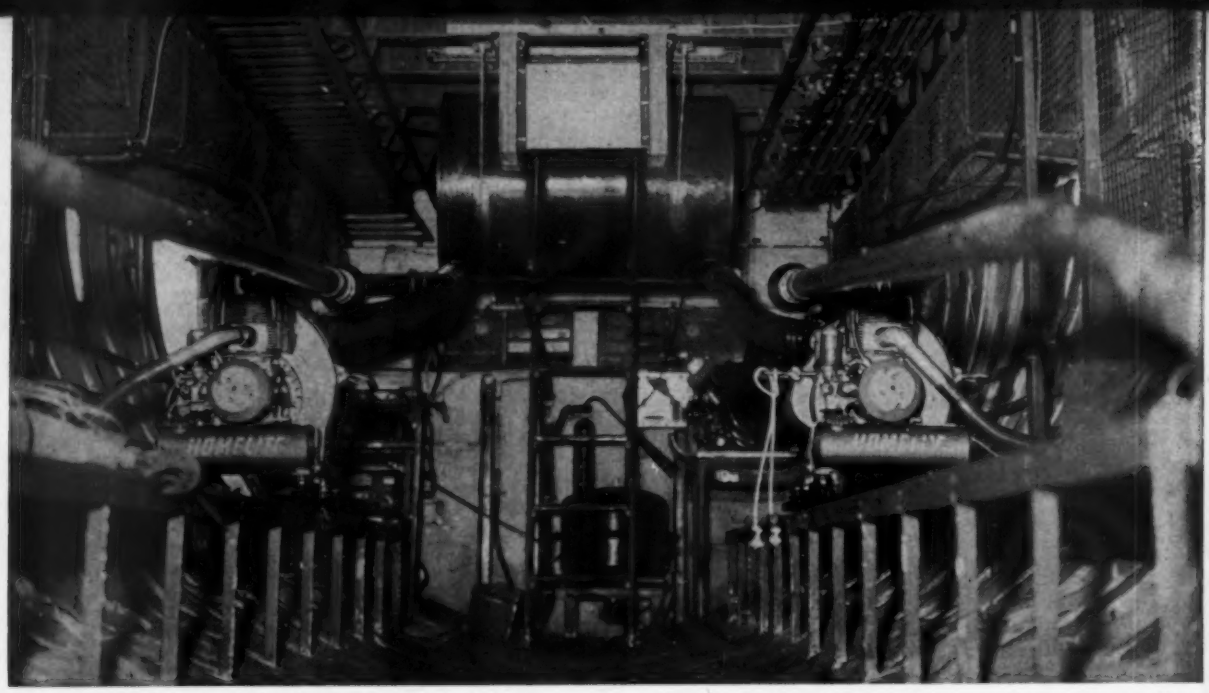
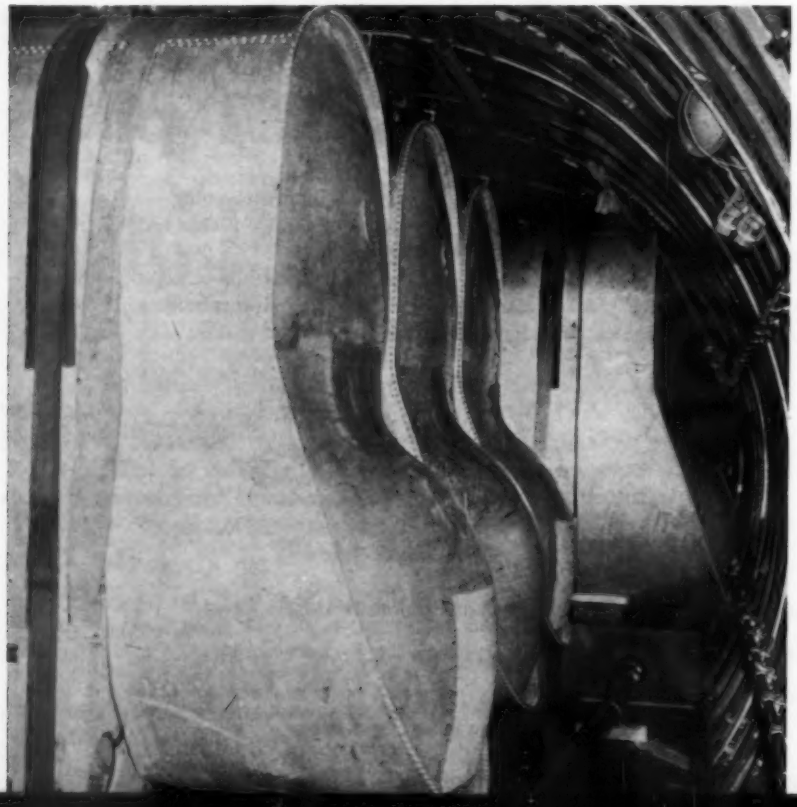


View of YC-97 lower deck, showing header tank (upper center), and two gas-powered insecticide pumps. Large diameter lines on either side of photo supply spray fluid to spray booms.

Aerial spraying: big and getting bigger

Nine 600-gallon B-25 ferry tanks are removed through rear cargo door and ramp which have been retained for future freight operations. Except for revision of connectors, tanks have been used "as is."



DEPARTMENT OF AGRICULTURE, armed with federal and state funds and two YC-97 Boeing Stratofreighters, is launching aerial spray operations on a new, expanded scope.

The Agriculture-directed project, involving gypsy moth DDT spraying of some 1½ million acres of Long Island woodland, could move spray operations into the big business bracket. It means more acreage to be covered, larger expenditures and bigger aircraft.

The YC-97s are the property of DeLong Aircraft Co., a subsidiary of DeLong Corp., New York, builders of offshore oil drilling rigs. DeLong purchased four of the early-model Stratofreighters from the Air Materiel Command surplus at Davis-Monthan Air Force Base, Arizona, for a reported $36,000 each.

Two of the aircraft were leased to Lebanon Chemical Co., Lebanon, Pa., at a "wet operation" rate of $450 per hour and are flying under the name "Lebanair."

Converted to spray configurations by Potter Aircraft Co., Burbank, Calif., the two aircraft are flying missions at a true 200 mph, about 200-300 feet above the tree-tops. Each aircraft is expected to cover approximately 12,000 acres per hour, including time consumed in ground operations.

Although exact figures are not available, it is estimated that Lebanair's

bid was based on 20¢ to 25¢ per acre for flight operations, plus 50¢ to 60¢ per acre for the insecticide in its final form.

To retain cargo adaptability of the YC-97, Potter Aircraft installed nine, quickly-removable 600-gallon B-25 ferry tanks on the upper cargo deck. These feed liquid to a header tank on the lower deck and through two gas-powered Homelite pump units to a 40-foot spray boom on each wing.

The system has a total capacity of 500 gallons per minute, but actual operations will be based on a flow of 278 gallons per minute.

Both spray booms have distribution nozzles every 12 inches. The entire unit, including the external boom supply lines, are easily removed for other operations.

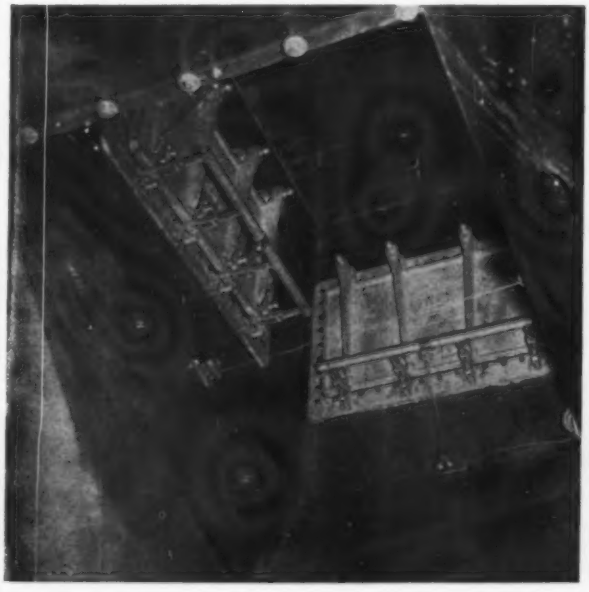
The spray tanks may be filled through exterior fittings to minimize ground time, and the emergency dump system, controlled by the co-pilot, can jettison 5,000 gallons of spray fluid in 18 seconds.

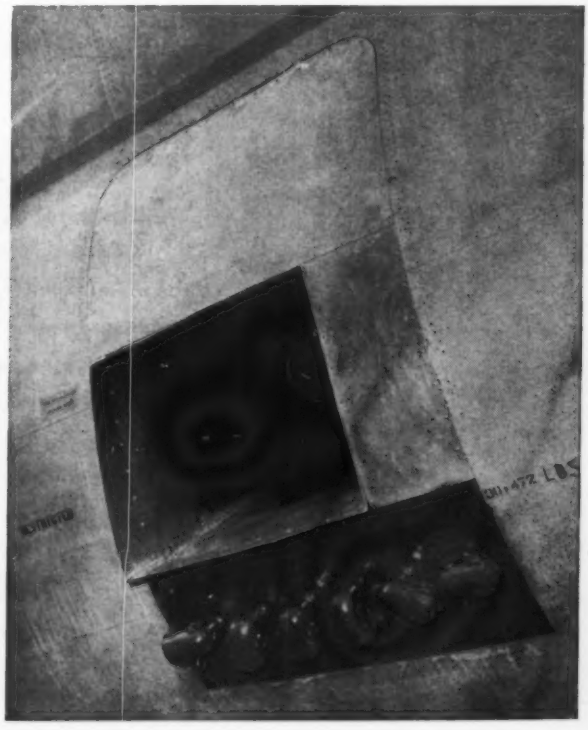
This is not Lebanon's first experience with the use of large aircraft in spray operations, although the YC-97s are the biggest pieces of equipment they have used to date. The company has used B-17, B-18, A-20, Boeing 247, TBM and C-82 aircraft on past projects.

If the first two YC-97s are successful in the Long Island project, the two additional ships, now at Tucson, will be adapted for spray work.

Gas-powered pump units and all spray boom valves are controlled from pilot's pedestal, although a qualified spray expert will take over this duty from engineer's seat.

Cable-controlled dump system (below) allows margin of safety in emergencies. Operated by co-pilot, system can dump 5,000 gallons in 18 seconds through these valves. Emergency dump chute and ground filling points are located in former aft exit door (right.) Nine tanks are rigged in groups of three, with two filler connections for each group.





Hertz to launch rent-a-plane service, with 50 stations, Cessna equipment

WALTER L. JACOBS (right), president of The Hertz Corporation, and James Herrick, Cessna Aircraft's fleet sales research manager, discuss Hertz's rent-a-plane plan.

A NATIONAL RENT-A-PLANE SERVICE, through which three types of Cessna aircraft will be available on both a "fly yourself" and charter basis in major U.S. metropolitan centers, will be started this fall by The Hertz Corporation.

The company is establishing a wholly-owned subsidiary, Hertz Rent-A-Plane System Inc., which will issue licenses to selected dealers of Cessna Aircraft Co. to conduct the rentals. During the first year, 50 rental stations are planned, and it is expected they will do a volume of $2.5 million.

Three Cessna types will be available: Model 172, seating four passengers and cruising at 120 mph.; the four-place 155-mph. Model 182, and the five-place twin-engine Model 310, cruising in excess of 210 mph.

The national suggested average rental cost of the Model 172 will be $1 per hour plus 15¢ per airplane mile, Walter L. Jacobs, Hertz president, said. While costs are expected to vary because of local conditions, on the average a 200-mile trip would cost about $32, or 4¢ per seat-mile for a four-passenger load, he added.

Customers will be able to rent planes at any Hertz rent-a-car office or at the office of the Cessna dealer. As in the case of cars, reservation can be made at any Hertz office to rent a plane at destination.

Hertz plans a nationwide credential system to permit a qualified pilot to rent a plane without an individual check-out preceding each flight. Once a pilot has rented a particular plane, he will be issued a universal check-out card which will qualify him to fly the same model subsequently.

New engineering firm

Era Engineering, Inc., has been organized at Santa Monica, Calif., by a group of aircraft scientists and engineers to develop new systems in electronics, radiation and rocketry.

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AIR SAFETY

Mobile foam generators make possible control of crash fuel fires for few vital minutes

Development of high-capacity mobile foam generators at Boeing Airplane Co.'s Wichita Division has opened the way for a technique of getting quick, temporary control of aircraft crash fires where large amounts of fuel are involved.

Designed to gain complete control over fuel fires for a minimum of two or three minutes, or long enough for the rescue of all crew members and passengers, the new equipment was developed from an idea of Boeing Fire Marshal Willis Seal.

Two of the new multi-purpose fire trucks were recently demonstrated to a group of representatives of Air Force commands, airframe manufacturers, airport managers and insurance underwriters.

Each unit is capable of delivering 40,000 gals. of generated foam within four minutes from distances up to 200 ft.—four times the capacity of available commercial equipment. Three men are required to operate the equipment. Other models require seven.

The units consist of a trailer-tractor vehicle, a water tank with capacity of 4,030 gals., and a 300-gal. foam tank. Two American LaFrance "blabbermouth" turrets are mounted on top. A pair of 560 gpm single-stage centrifugal pumps powered by two 110-hp engines are mounted in a pumping compartment.

Turret operators are positioned in open circular control stations. Each turret can be rotated 360° and moved 70° in a vertical plane. Two hand lines are also installed on each truck.

Details of the basic design were worked out by the U.S. Fire Protection Engineering Service, Inc., Kansas City, Mo. The Monatco Manufacturing Co. of Kansas City built the equipment under an Air Materiel Command contract. Cost per unit is $54,000.

The two units have been integrated into the Boeing-Wichita fire department, which has responsibility for 598 acres —118 under roof—at the jet bomber facility.

Fire Marshal Seal said that his department consists of four officers, five inspectors and 64 fire fighters on a full-time, three-shift, seven-day-a-week basis. In addition an auxiliary fire brigade has a membership of 2,800 specially trained volunteer employees.

Besides the two 0-15-L trucks, the Boeing mobile equipment includes two 750 gpm combination pumpers, five pieces of crash fire-fighting equipment, and one ambulance. Equipment is housed in three fire stations centrally located in the main plant and flight-line areas.

Fixed equipment includes five reservoirs totaling 2,050,000 gals., 25 miles of underground pipes, ten pumps with combined ratings of 20,500 gal./min., four foam systems with 24,000 lbs. capacity and eight high-pressure Co_2 systems.

Safety briefs

Civil Aeronautics Administrator James Pyle has named Lucius W. Burton to a new post as CAA planning and development director. Position has been created to embrace former program and policy planning within the agency, but with a greater emphasis on research and development.

Circumstances of the crash of Lockheed's U-2 high-altitude research plane in Utah indicate oxygen lack may have been the cause of the accident. The pilot's body was found in the wreckage of the airplane.

Lockheed's F-104 was grounded for a period of about two weeks to permit installation of dual ignition systems by General Electric for the plane's J79 engines. Fix is to improve air start reliability. Lockheed recently lost an F-104 on a test flight because of a flame-out.

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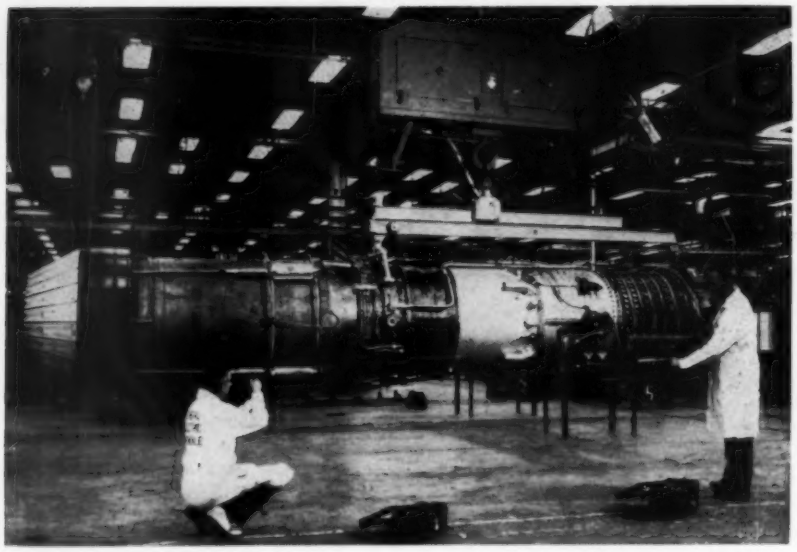
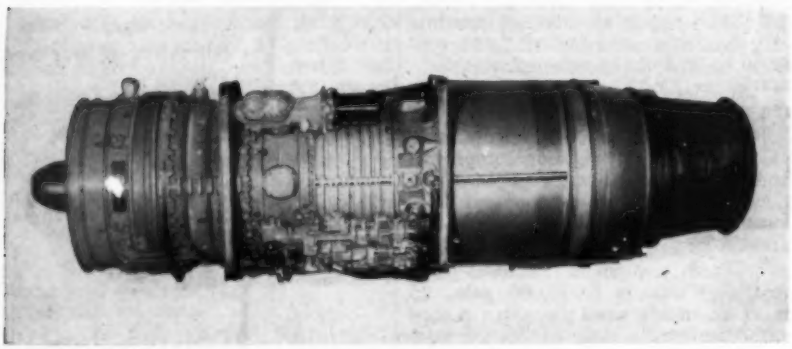
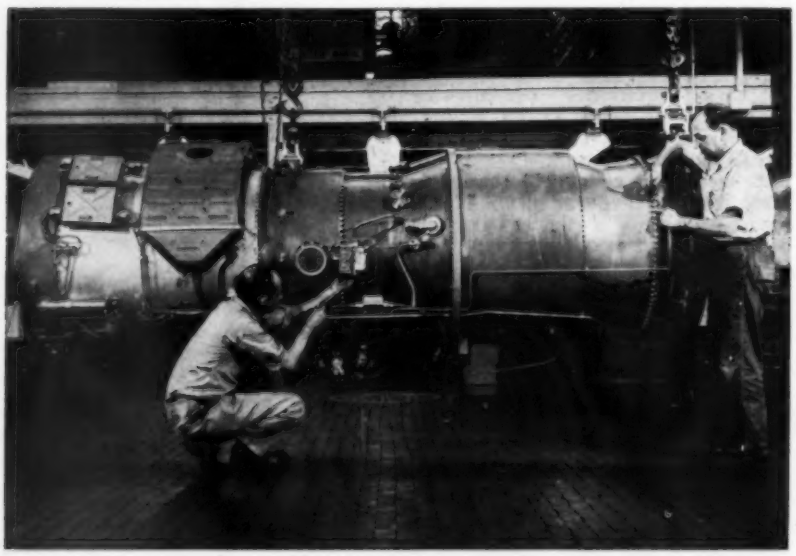
Turbine builders unveil top engines



GENERAL ELECTRIC J79 with variable nozzle (left) at military power setting.



CURTISS-WRIGHT TJ38 is commercial turbojet venture, rated at 12,500 lbs. thrust.



PRATT & WHITNEY J75, rated in 15,000 lbs. thrust class, is 58.5 in. in diameter.

THREE U.S. jet engine manufacturers —Pratt & Whitney, General Electric and Curtiss-Wright—have taken the wraps off their front-line turbine hardware.

First, P&W got the Pentagon nod to discuss its 15,000-lbs.-thrust J75, tabbed the most powerful production jet engine in the free world. With afterburner, the J75 is unofficially rated in excess of 20,000 lbs. thrust.

Only a week later, General Electric unveiled its J79, rated at 10,000 lbs. thrust without afterburner, producing "more thrust per pound of engine weight than any other large jet in production today," according to G.E.

Third engine, a purely commercial model, was introduced by Curtiss-Wright at its Quehanna, Pa. research and development center. Designated the TJ38, the C-W jet is rated at 12,500 lbs. and represents a wedding of the company's J67 and Britain's Bristol Olympus, rated at 13,000 and 16,000 lbs. thrust respectively.

But unlike the closely-guarded announcements of the J75 and J79, both still highly classified engines, Curtiss-Wright gave full performance specifications on the TJ38. Takeoff specific fuel consumption was pegged at 0.718 lbs./ lb. thrust/ hr. and 0.88 at cruise rating of Mach 0.8 at 36,089 ft. altitude and 3,000 lbs. thrust.

TJ38 weighs 3,600 lbs. dry, measures 121 in. long and 41 in. in diameter across combustion chamber.

J75 is 50% more powerful

Although P&W could not disclose similar figures for its J75, it described the engine as an axial-flow design only slightly larger than the predecessor J57, yet nearly 50% more powerful. The J75, recently certificated by CAA for civil use in Boeing 707 and DC-8 jets, measures 191 in. long and 58.5 in. in diameter.

GE, meanwhile, won USAF authorization to discuss its use of the variable-pitch stator concept in the first six of 17 stages of the J79's single-rotor axial compressor. This feature, now being employed in all future GE turbine engine development projects, is the company's answer to the twin-spool approach to low and high-altitude compressor efficiency used by P&W and Curtiss-Wright in the J75 and TJ38.

GE said the J79 measures 17 ft. long and less than 36 in. in diameter. Although exact weight of the engine was not revealed, company engineers said the J79 with afterburner weighs less than firm's earlier J47, which weighed about 3,200 lbs. when fitted with afterburner.

The J75 and J79, competing in both civil and military installations, are now each slated for six specific aircraft programs.

Why blunt nose is best for long-range missiles

In August, 1953, a clearing was made in the thermal thicket by H. Julian Allen, chief of the high-speed research division of the National Advisory Committee for Aeronautics' Ames Aeronautical Laboratory at Moffett Field, Calif. For this work, Allen was recently awarded his agency's highest honor, the Distinguished Service Medal.

The results of his analysis are contained in a newly classified research memorandum entitled, "A Study of the Motion and Aerodynamic Heating of Missiles Entering the Earth's Atmosphere at High Supersonic Speeds," by Allen and A. J. Eggers.

ALLEN

It was in this report that Allen came to what was in 1953 a radical conclusion. He demonstrated that practical long-range ballistic missiles should have blunt rather than sharply pointed noses.

Allen was concerned with the relative rather than absolute design features of high-speed missiles descending from great heights through the atmosphere.

He made two major assumptions in his equations of motion for missiles: (1) the missile's drag coefficient is constant, and (2) air density varies exponentially with altitude. These assumptions are generally accurate for high Mach number vehicles traveling in an isothermal atmosphere.

Effect of drag noted

Based on these assumptions, Allen found that a missile's deceleration due to drag is so much greater than its acceleration due to gravity that gravity effects can be neglected. Therefore, the missile's flight path is a straight line, and the missile maintains the flight-path angle it had at entry into the atmosphere.

Allen showed that for practical missiles, maximum deceleration occurs at altitude. One of the more interesting characteristics of such missiles is that maximum deceleration depends only on entry speed and flight-path angle, and is independent of physical characteristics such as mass, size and drag coefficient of the missile.

Two aspects of the aerodynamic heating problem of missiles descending through the atmosphere were studied. The first was concerned with the total heat absorbed by a missile. Allen related this heat to the amount of coolant a missile would have to carry to avoid disintegration.

He observed that for relatively lightweight missiles, such as today's, those having blunt shapes (high pressure drag coefficient) required the least weight of coolant.

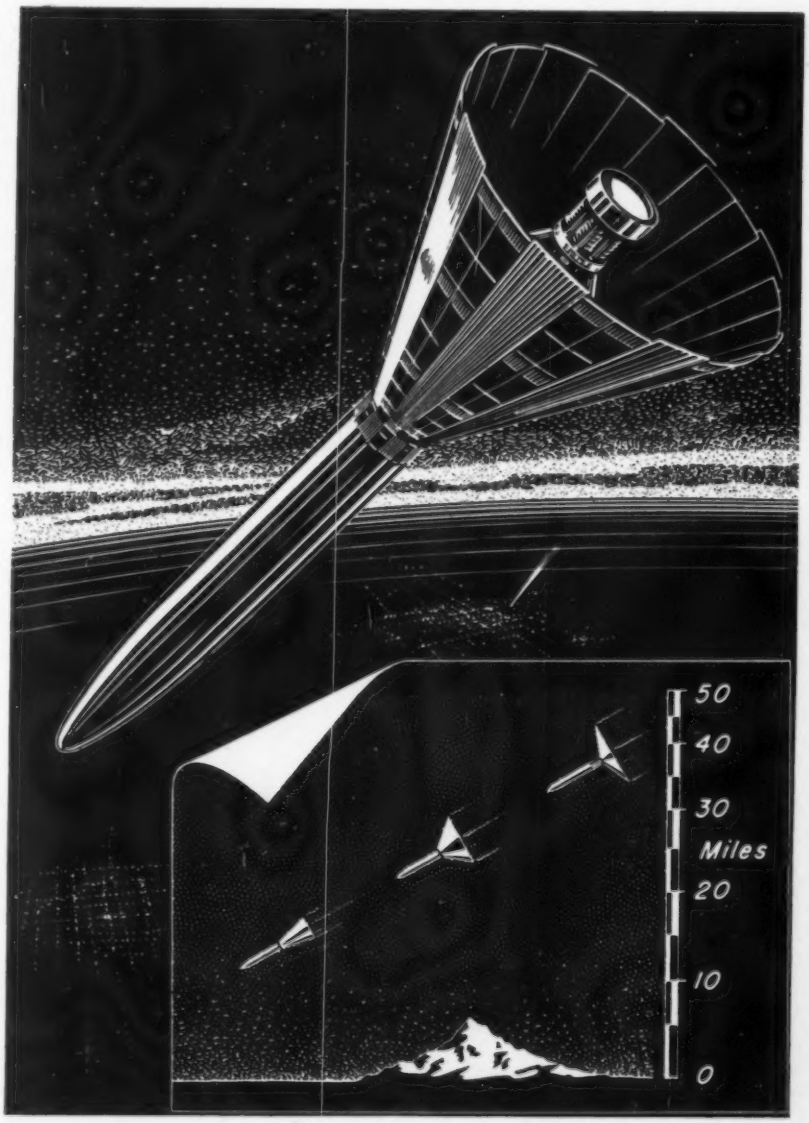
For heavier missiles, a long slender shape (low skin-friction drag coefficient) appeared to be best.

The second aspect of the heating problem was concerned with the rate of heat input, which factor determines the design of local structure. Of particular interest was the thermal stresses arising at the forward tip of a missile.

Allen concluded that the maximum average heat-input rate, and hence the maximum average thermal stress, could be decreased by using either a blunt or a slender missile. Missiles of intermediate slenderness are definitely to be avoided.

He found that thermal stresses were reduced by using a missile shape having the largest permissible tip radius and overall drag coefficient. This means

FLARED-SKIRT MISSILE penetrating earth's atmosphere. Flared skirt provides missile with advantages of high drag during entry into earth's atmosphere.



that the blunt, high-drag shape has the smallest maximum average heat-input rate.

There are disadvantages to very high drag shapes, which may be unacceptable if:

(1) The low terminal speed permits effective military countermeasures.

(2) The lower average speed of descent increases the wind drift error at the target.

(3) The magnitude of maximum deceleration is greater than can be allowed.

These disadvantages may be alleviated by using variable geometry arrangements. A design proposed by Allen is a round-nosed shape with a conical afterbody of low apex angle. Attached at the shape's base would be an extensible skirt.

With the skirt flared, the advantages of high drag are obtained during the entry phase of flight. As the air density increases with decreasing altitude, the skirt's flare can be decreased. In this way the drag is varied to produce the desired deceleration and speed history. In turn, the desired heating characteristics can be obtained.

Self-powered guided missile tower can be assembled in three days

A "relatively portable" guided missile tower that can be raised or lowered by its own power in 11 minutes, and which can be assembled like an Erector set in three to five days in the field, has been unveiled by the Noble Co., Oakland, Calif.

The 120-ft. tower has its own power source to raise it from horizontal to vertical position and move it along two parallel sets of standard railroad track at the missile-launching site. It was built by Noble for use at Air Force's missile test center at Patrick Air Force Base, Fla.

The tower weighs 340,000 lbs. including five elevator work platforms, hammerhead crane and trolley with two 15-ton hoists, and two passenger elevators to carry personnel to the work platforms.

The tilting feature is particularly valuable, according to Noble, during Florida's hurricane season. However, in the vertical position it is designed to withstand winds of 75 mph.

Base section measures 30x60x10 ft. and contains switchgear, electric control room, air conditioning and electric generating equipment, air conditioned laboratory and office for crew, and the raising-lowering power source.

Control is handled by one man at a console panel atop the base section. Under the base are four rail trucks, each with its own drive.

The complete tower travels on rails to and from missiles, and with the missiles to position them on the firing pad.

Power is supplied either by a built-in diesel electric generator or from external fixed-power source of 120/208 volts.

Each of the five work platforms can be moved vertically and allow 360-degree access to the missile in the different size missiles. Passenger elevators operate on each leg of the mast.

Shipment of the tower from Oakland to Patrick will be handled by 14 freight cars.

Rocketdyne producing rocket engines for Thor

North American Aviation's Rocketdyne Division is producing a number of liquid propellant rocket engines for the Thor ballistic missile.

Production under an unannounced Air Force contract is under way at the Neosho, Mo., plant.

The contract is expected to increase employment at Neosho from 650 to 1,500 by June 1958.

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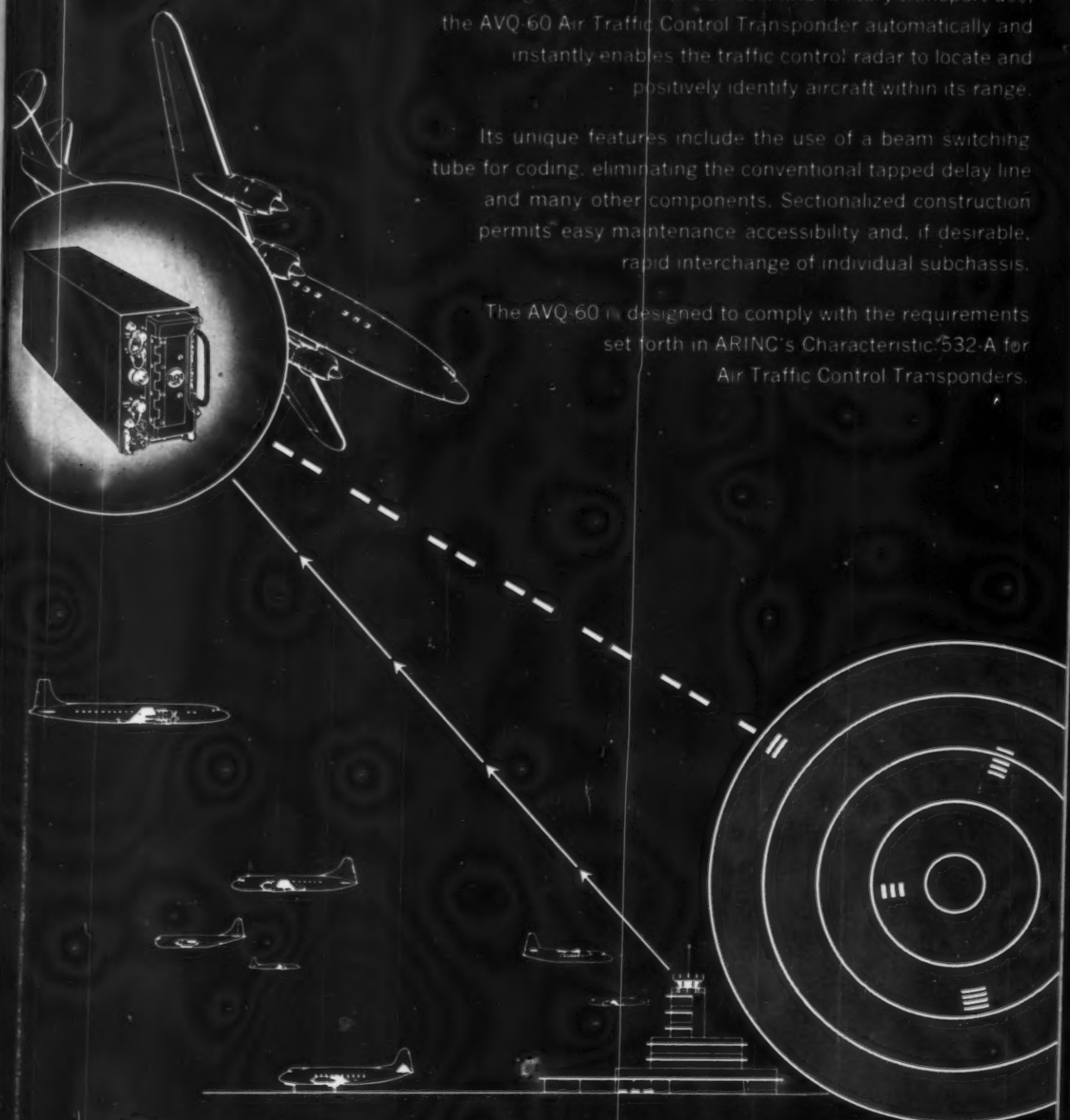
RCA ANNOUNCES . . . THE

AVQ-60 AIR TRAFFIC CONTROL TRANSPONDER

Designed for airline, business, and military transport use, the AVQ-60 Air Traffic Control Transponder automatically and instantly enables the traffic control radar to locate and positively identify aircraft within its range.

Its unique features include the use of a beam switching tube for coding, eliminating the conventional tapped delay line and many other components. Sectionalized construction permits easy maintenance accessibility and, if desirable, rapid interchange of individual subchassis.

The AVQ-60 is designed to comply with the requirements set forth in ARINC's Characteristic 532-A for Air Traffic Control Transponders.



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THE LOCKHEED C-130 HERCULES IS THE ONLY COMBAT CARGO TRANSPORT IN USAF SERVICE THAT CAN PARADROP 20-TON LOADS AT THE TOUCH OF A PUSH-BUTTON. THIS NEW PROP-JET "STRONG-MAN" OF THE AIR IS BUILT BY LOCKHEED'S GEORGIA DIVISION.

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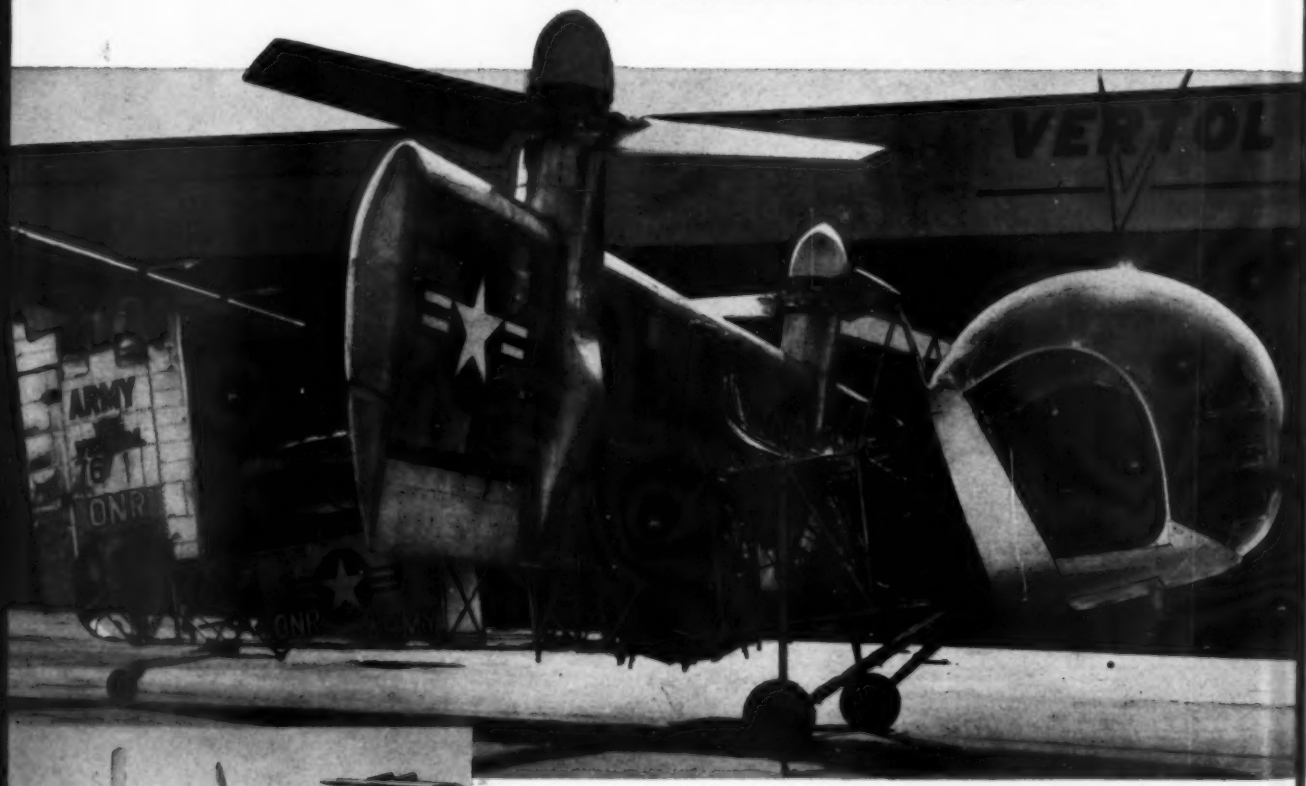
VERTOL tests world's first Tilt-Wing VTOL Research Aircraft

The new Vertol 76 is a true Vertical Take-Off and Landing (VTOL) aircraft, an experimental vehicle that casts a large shadow into the future.

With its ability to take off, hover and land like a helicopter it is independent of all but the most rudimentary landing area. Yet it flies from point to point with the dispatch of a turbo-prop passenger plane.

In this pioneer air vehicle the wing and roto-propellers tilt as a unit through a 90° arc at the will of the pilot. For vertical flight he rotates the wing upward. To fly level he tilts the wing forward. Given a small runway, he can set the wing at the most effective angle to operate Model 76 as a Short Take-Off and Landing (STOL) aircraft and thus increase payload potential.



The Model 76, soon to undergo flight tests, has been developed by Vertol for the Army Transportation Corps and the Office of Naval Research as part of the military's ceaseless quest for greater mobility and efficiency. From flight tests will come experience and knowledge applicable to the bright future of VTOL in military and commercial aviation.

Since 1943 Vertol has been a pioneer in research and development of vertical lift aircraft. It is now the largest independent manufacturer of helicopters. You may find that our know-how, our experienced personnel, our test facilities and our productive capacity can help you solve a problem.

Engineers, if you are not already working for the government or defense industry, investigate job opportunities with Vertol.

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Stanford Industrial Park: new approach to industry

University develops 9,000 acres as heart and brains of booming San Francisco Bay electronics area

by Henry P. Steier

"WE DO IT a little differently" was the modest admission of the man behind an idea that stands out like a classic in the midst of the phenomenal electronics industry boom taking place in the San Francisco Bay area.

The idea is a model industrial city, and the guiding spirit behind it is Stanford University's young business manager, Alf E. Brandin.

For the last seven years Brandin has been steering development of part of Stanford's 9,000 acres toward a new kind of academic-industrial-community partnership.

Heart of the planning is to make money for the university through leases on some of its campus acres, and at the same time provide an academic-industrial climate that will mutually benefit the lessees, the people they employ and the school.

Stanford's campus is located in the city of Palo Alto thirty miles south of San Francisco on the peninsula. Part of the leased land development is called the Stanford Industrial Park.

Today the park occupies about 1,000 acres of the green rolling hills that form one end of the horseshoe-shaped Stanford campus.

The park is now becoming dotted with buildings that at first glance look like parts of a residential park development. They are not. The buildings are occupied by electronic, missile and other types of firms, and the land under them is leased for 99 years.

The 99-year leases were the only way the school could get around a limitation set by Senator Leland Stanford in the deed of conveyance by which he gave the land together with $2 million to found the school in 1885.

Prophetically, Stanford's deed stipulated of the lands, "They can never be alienated, and will, therefore, be an unfailing support to the institution."

Twelve years ago, after World War II, the once relatively well-endowed Stanford University found its money could not go as far as it once did. It was then that the land was looked to as a source of revenue.

After trying to grow flax and wholesale flowers on the land for a while, Brandin got the lease-hold idea. The land planning firm of Skidmore, Owings and Merril, which laid out the city of Oak Ridge for atomic-energy work, was brought in to help.

The land was topographically plotted for best use of each piece, and 50 acres were set aside for light, non-smoky, non-noisy and otherwise non-objectionable industry.

What followed, Brandin told this writer, was beyond the school's fondest hopes. Varian Associates were the first to come in. They took ten acres.

"This surprised us," Brandin said, "but now Varian has 35 acres." Already under construction are two new Varian buildings to be added to the firm's existing building.

By September 1957 a total of 300,000 square feet will be available for expanded development and production of Varian's Klystrons, traveling wave tubes, backward wave oscillators and instruments.

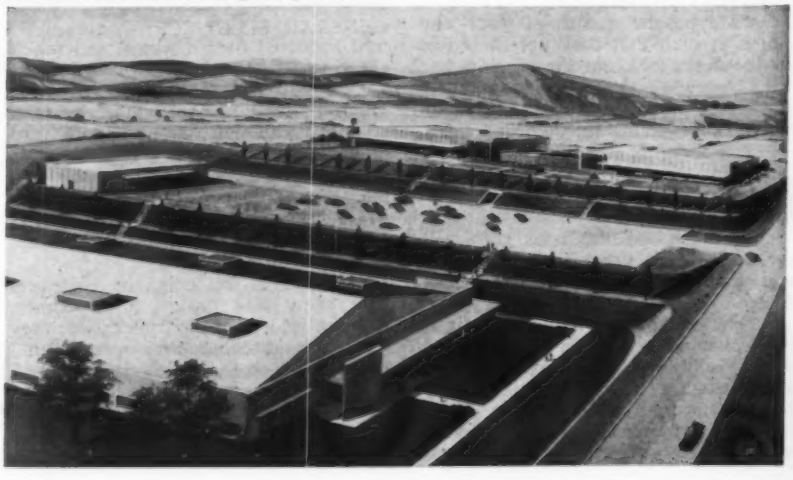
To meet the demand for industry that followed Varian, Stanford jumped its Park acreage to 165, then to 220 and now to 350. And it is looking to ultimate development of 1,000 acres for this purpose.

After the jump to 220 acres, the planners thought that was it, because it was the bulk of flat and level land. They know now that they were mistaken because industry thought it also should have plants that resembled a home with a view.

Along came Hewlett-Packard and Lockheed Missile Systems division,

STANFORD UNIVERSITY'S Hoover Tower at right is symbolic of ever-closer moving partnership between academic and industrial activity in Bay Area. Tower dominates scene over the Industrial Park where Lockheed Missile Systems division is located (left). Going up in background is Hewlett-Packard Co.'s new plant.

ARTISTS' DRAWING of Lockheed's plan for 218,000-sq.-ft. missile research center is typical of Industrial Park planning. Land lessees must attach such illustrations to leases and stick to original plans.



Stanford University industrial park lessees

Admiral Corp.—electronics research—6 acres
Beckman Instruments, Inc.—medical equipment—5½ acres
Clark and Stromquist—architects—1 1/3 acres
Eastman Kodak Co.—color film processing—15 acres
General Electric Co.—microwave laboratory—6 acres
Ginn and Co.—book publishers—2¾ acres
Hewlett-Packard Co.—electronics test equipment—40 acres
Houghton Mifflin—book publishers—3 acres
Levinthal Electronic Products—1 acre
Lockheed Aircraft Corp.—missile research—22 acres
Palo Alto Clinic—industrial medicine—3 acres
Palo Alto Engineering—electronics components—2 acres
Scott Foresman—book publishers—3 acres
Preformed Line Products—powerline equipment—5½ acres
Varian Associates—electronics research—35 acres
Ampex Corp.—tentative—30 acres
Link Aviation Corp.—tentative—6½ acres

which took 40 and 22 acres respectively and both plots were on hills.

The University's planners feel "that the school contributes tremendously to the cultural atmosphere of the area, and that it must keep the area not just normal but admirably "good," Brandin explained.

They feel there's something besides pure land available. Before land is leased there's lots of talking, thinking and checking. Nothing happens overnight when an interested firm contacts Brandin about coming in.

"This isn't a normal real estate development where you grab somebody and say here's a piece of land for X-dollars—sign a deed, agreement or option," Brandin said.

"We say to them: Look, after we find out what kind of business you're in, whether it's compatible with this area, what you plan to do here, how big a plant you need, how many employes you'll have and the nature of their work, whether there's some benefit we can give and that you can give, then we'll plan."

Many factors go into the planning, and it's done in carefully judged steps. For example, a company might need ten acres. The choice of which ten acres might be related to whether most of the employes would use automobiles or would want to use public transportation.

Parking is not permitted on the campus streets, and buildings must be set back a minimum of 50-90 feet, depending on location.

Stanford tries to put the company in an atmosphere that matches the nature of its employes. "Maybe a view is needed," Brandin pointed out as an example of planning needs.

"Maybe the nature of your employes is such that they put their feet on the desk, look out the window and think, but while they're thinking they're making a million bucks for your company," he explains to interested firms.

Landscaping is another consideration. Enough land for not only the buildings but landscaping as well must be leased.

If the initial discussion goes well, the next step is submission of building and siting plans to the university's committee.

The company's architect submits both plan and elevation views of proposed facilities. The university wants to know exactly what the building will look like.

No signs, flashing lights, smokestacks or other structures above the roof line are permitted. The building color must be shown, and it must harmonize with the surroundings.

There is a large map and plan room near Brandin's business office in a university building. Against its walls on easels are many architects' drawings from prospective tenants.

Here the university's investigating committee meets to look over new proposals. However, the review goes beyond that, Brandin said, and the neighbors are also consulted.

Gets tenants' suggestions

When a new set of plans comes in, Brandin calls in people who already are Park tenants. He gets their views and asks for suggestions. "They have a right to this consideration," Brandin insists, "and they are fairly critical and come up with good ideas."

"We don't give them the right to vote, but in this way they keep conscious of their responsibility," he said, adding: "Although this all sounds very difficult, actually it's not. It's assurance to the company that comes here that the fellow who lives next door to him will be subjected to the same thing he's for, and makes for a much more sound economic investment."

Asked if the neighbor reviewers ever show bias toward a newcomer, Brandin said, "Only to this extent, they worry about competitive salaries and markets, but so far there's no problem."

At this time 15 firms have signed leases and three more are expected to sign soon. Of the 18 firms, more than 50 percent are in electronics.

Link Aviation's plans are not yet submitted, but they are expected to take 6½ acres. Ampex Corp's lease is not signed but they have submitted plans for a 30-acre facility. Sorenson and Co., Inc., is expected to come in soon.

In the plan room there is an architect's drawing for the buildings of a new organization identified as a two-part research organization to be known as International Research Foundation and the Cooperative Research Foundation.

Brandin said the International organization was planned as a facility where scientists from all over the world could come to contribute their abilities for basic research.

In his desk Brandin has a little black book which lists about 200 parties interested in Stanford's land development. Among these are foreign governments.

GENERAL ELECTRIC CO.'s electron tube development laboratory in the Stanford Industrial Park. Location was selected to take advantage of advanced communication and radar tube work in the area.

Last year a 10-man Finnish management delegation visited the Industrial Park to study it. Two other governments have sent delegations.

A man from Tucson, Ariz. who has 200 acres wants to duplicate on his land the quality of the Park. Many people who have similar plans in mind, Brandin cautions, forget or overlook the importance of a university to industry in this age.

Among the benefits are opportunities for graduate students, for intermingling of the school's faculty with industrial personnel, and the great research capability of the school.

Leasing interest is still strong.

Brandin noted, but it has had a slight tendency in the past three months to slow down because of tight money.

Price of the park land varies. It ranges from $21,000 to $65,000 an acre on a lump sum basis.

However, the planning takes a long time. From six months to a year are usually needed to talk design plans, submit them and get approval, sign the lease and start building.

Overall business is still humming. At the other end of the horseshoe-shaped campus a new city is rising. Related to the Industrial Park it is planned as a shopping center and residential area.

A $15-million shopping center of seven buildings with 50 stores is under-

ALF. E. BRANDIN, "idea man" and business manager behind Stanford University's campus land development in Palo Alto, Calif.

way. Largest building is a $3-million department store.

Some of the buildings are being built by firms that hold leases. Others are being built by Stanford. These will be rented on a profit-sharing basis with a minimum annual rental.

Together with this development Stanford has provided acreage area for 9,000 residences that will range from ranch style to estate-type homes.

This area will be divided into neighborhood units having their own local stores, schools, churches and parks. Together with the city of Palo Alto, a $20-million medical center will be developed.

Up and down the San Francisco-San Jose highway the name "Industrial Park" is being copied by enterprising land developers, but they are not quite the same.

"Planning commissions all over the country are amazed at the plan," Brandin said. "We have lots of critics but are delighted to hear their views."

Modestly enough, he concluded, "Maybe it's because we don't know how to do these things that we came up with the idea."

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NEW PRODUCTS

Emergency oxygen masks for passengers in jetliners will operate automatically if pressurization fails

EMERGENCY OXYGEN MASKS that will be dropped automatically in front of passengers on commercial jetliners should cabin pressurization fail are being manufactured by Scott Aviation Corp.

Automatic operation of the system is activated by a control in which an aneroid, manufactured by Bridgeport Thermostat Division of Robertshaw-Fulton Controls Co., senses the change in cabin pressure and trips a trigger which, in turn, sets the emergency system into operation.

Under normal operating conditions, the emergency oxygen masks are concealed by trap doors in the bottom of the hatrack above each passenger's seat. If cabin pressure drops below a predetermined setting, the pressure-sensitive aneroid activates the entire oxygen system, automatically opening the trap doors and dropping the masks.

The aneroid in expanding exerts a direct 1½-lb. force against a column-loaded leaf spring. Once the spring is deflected past center, the force is multiplied to 8 lbs. which is sufficient to trip the trigger and release the oxygen valve.

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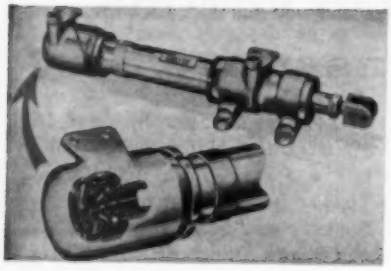

Hydraulic cylinder

Production of a self-locking hydraulic cylinder has been announced by RONSON HYDRAULIC UNITS CORP.

The unit, designed specifically for aircraft doors, combines linear actuation and mechanical locking in a single package.

Integral lock is operated by hydraulic pressures up to 4,500 psi. It can be designed to lock and unlock at any desired pressure and any load in extended or retracted position.

Circle No. 15 on Reader Service Card.

Fuel flow measurement system

Jet fuel flow measurement system designed by NORDEN-KETAY CORP. registers up to 100,000 lbs./hr. with extreme accuracy over entire range.

System uses Norden-Ketay IF-1 indicator matched with 2 to 8 TF-2 transmitters to measure rate of flow of fuel to jet engines. Weighs 7 lbs., range 0 to 12,000 lbs./hr. accuracy ±5%, temperature —55° to 121°C, altitude 1,000 to 80,000 ft., pressure drop less than 7 psi. Hermetically sealed.

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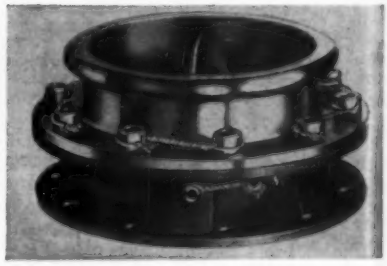

Pneumatic check valve

BARBER-COLMAN CO. is manufacturing a 3″ pneumatic check valve that combines rugged construction, long life, low leakage, low pressure drop, compact size and minimum weight.

The valve has an operating temperature range of —65° to 750°F. For a typical unit, leakage does not exceed 0.1 lb./min. for any combination of air temperature from 80°F to 750°F and air pressure from 5 psig to 210 psig.

Circle No. 17 on Reader Service Card.

Fuel control valve

UNITED AIRCRAFT PRODUCTS, INC., has introduced a fuel control valve for pilot burners.

U-518914 valve was designed to meter fuel flow as a function of compressor and discharge pressure with a constant inlet fuel pressure and a scheduled fuel back pressure. It senses air pressure variation and applies available pressure for direct proportioning of fuel flow for mixing and burning with air for optimum combustion efficiency. Weighs 20 oz.

Circle No. 21 on Reader Service Card.

Motor for missiles, rockets

A dc motor for use on missiles and rockets has been developed by ELECTRICAL ENGINEERING & MANUFACTURING Corp.

EEMCO Type D-927 is said to meet all requirements of today's aerial weapons. Weight is 7.25 lbs. Motor has 2-circuit noise filter for ungrounded systems, adding another pound. Speed is 9,900 rpm, load 0.5 hp, terminal voltage 27 v, 18 amps.

Circle No. 6 on Reader Service Card.

Motor gearheads

Four new precision motor gearhead adaptations in 1.062″ diameters are being produced by BOWMAR INSTRUMENT CORP.

Designed for use with size 11 motors, the gearheads are designed for maximum flexibility in servo mechanical devices and other control systems.

Operating load torque, 25 in. oz., starting torque .005 in. oz. ABEC Class 5 (or better) ball bearings used.

Bearing plates are passicated stainless steel.

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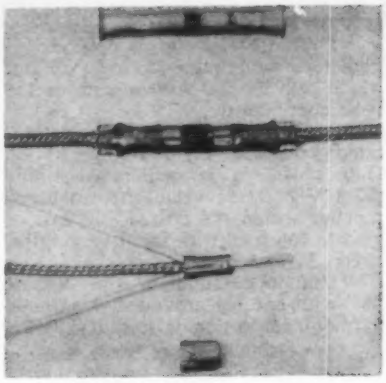

Shielded wire splices

A-MP shielded wire splices and shielded wire ferrules manufactured by AMP INC. provide faster, more compact splicing.

The splice between two shielded wires is made by crimping the connector on the end of each wire with a recommended tool.

Grounding connections are made with the ferrule and similar toolings. No loose pieces are needed to make the connections.

Circle No. 10 on Reader Service Card.

Two-way radio

NOVA-TECH, INC. is manufacturing Air-O-Ear, a new 2-way radio for private planes.

Air-O-Ear transmitter-receiver TR-102 has 10 channel VHF transmitter, tunable VHF receiver (108 to 128 mc), built-in modulator, power supply. Uses high-power crystals, conforms to newest CAA high-density zone requirements, has range of 50 to 150 miles.

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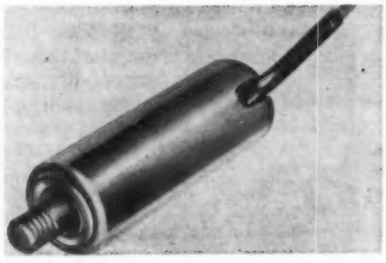

Pull-type solenoid

A miniature pull-type solenoid for aircraft, missile and electronic applications has been developed by CARRUTHERS & FERNANDEZ, INC.

Solenoid provides positive, trouble-free operation on computing devices, aircraft and missile components at high altitudes and high speeds.

Operating voltage is from 6 to 100 vdc with plunger operating under side force of 8 to 10 g. At .3 amps, 100 VDC, and 78°F is 1.3 lbs. with .03″ stroke.

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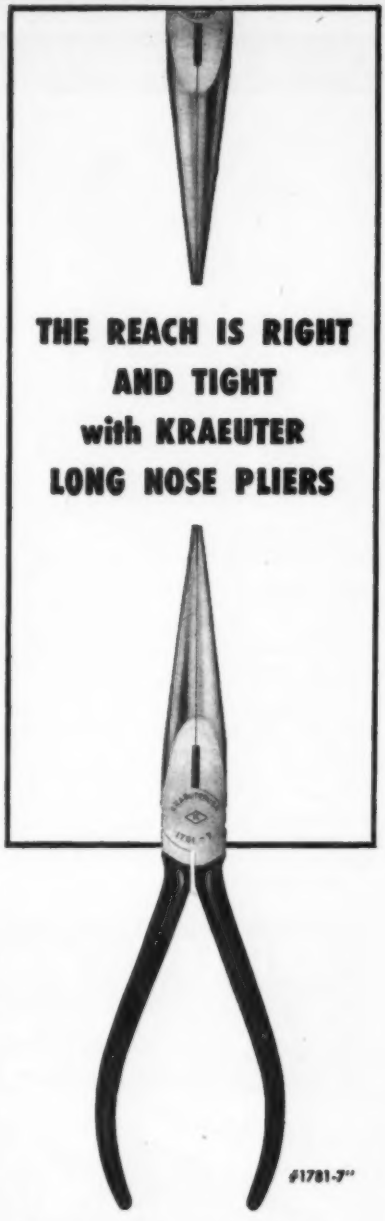

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FOR 100 YEARS THE FINEST IN HAND TOOLS 1850-1950 NEWARK, N. J.

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NEW PRODUCTS

Rate switch

A rate switch designed for use in control systems such as target drones and for vertical gyro cutout has been introduced by HUMPHREY, INC.

Designated Type RS01, the switch operates on either ac or dc power supply. It is equipped with primary single-pull, double-throw switch action. Contacts are rated at 100-ma, 28-v inductive load. For higher ratings it can be furnished with built-in relays for service to 5 amp, 115 v.

Circle No. 1 on Reader Service Card.

Miniature motor generator

DALMOTOR CO. is producing a miniature 400-cycle motor generator which delivers 100 volt-amperes at 115 volts continuously.

MG-146 draws 7 amperes at full-rated load with input voltage of 28. Output voltage is maintained within ±7.5 V of rated value and frequency remains within ±8 cps of 400 cps, no load to full load with input varying between 25 and 29 V.

Output termination is a 3-phase "Y" with one leg grounded. Maximum harmonic distortion is less than 3%.

Circle No. 16 on Reader Service Card.

Filter-centrifuge unit

PERMANENT FILTER CORP. is producing a filter-centrifuge unit, trade-named Centrifil, that is said to be extremely efficient for cleaning hydraulic systems and fluids.

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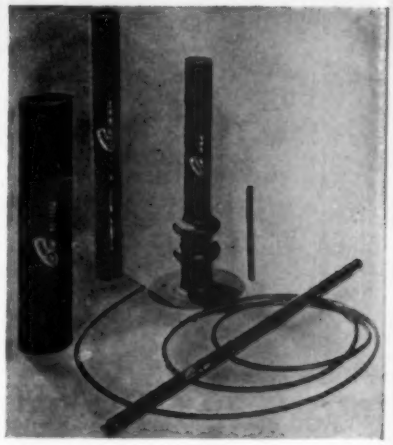

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Senate subcommittee moves to plug leaks

Proposed legislation would make it a crime to release governmental agency information prematurely

by William V. Henzey

A MOVE IS UNDER WAY to create a legislative plug for leaks of information from the Civil Aeronautics Board and other Federal regulatory agencies. If successful, it will become a Federal crime, punishable by imprisonment and/or fines, to give or receive information not yet ready for public consumption. It might even extend to those who attempt to exert pressure on CAB.

The move is a definite plan of the Senate Permanent Investigating Sub-Committee which last month concluded public hearings on its investigation of the apparent leak of CAB's August 2, 1956 vote in the New York-Florida Case.

More convinced that there was a leak or leaks than it is of who in CAB may have leaked, the Subcommittee is now concerned with what it calls "remedial legislation."

Senator Henry M. Jackson (D-Wash.), acting chairman of the Subcommittee, said he hopes to have the "pioneering legislation" passed at the present session of Congress. He has called on CAB and other Federal agencies to assist the Subcommittee in drafting appropriate legislation.

Currently, if a CAB employe leaks information in a pending case, the maximum punishment is dismissal. There are no available sanctions against the receiver of such information. Both the giver and receiver would be subject to the proposed new penal statute which envisions that CAB information involved would be "classified."

CAB Chairman James R. Durfee endorsed Jackson's proposal in an appearance before the Subcommittee. At the same time, Durfee inherited from the Subcommittee a record of conflicting testimony as to who gave out the advance dope on CAB's Florida Case decision last August.

From the standpoint of establishing a legislative interest in the CAB leak problem, the Subcommittee's widely-publicized investigation was a success. But from the standpoint of establishing the "leak," the investigation fell short of the mark.

Now it is up to CAB, which was being investigated in the first place, to review the record and, as Senator Jackson puts it, take "whatever disciplinary action you think necessary."

Only one CAB official out of 24 present at the August 2, 1956 meeting from which the Florida Case vote leaked, runs the risk of potential dismissal. He is former CAB executive director Raymond Sawyer. But the Senate Subcommittee's record involving Sawyer is, to say the least, inconclusive.

Former Trans-American Airlines official Laurance G. Henderson told the Subcommittee, on two separate public appearances, that his early information on the Florida Case either stemmed from his evaluation of certain events or from Sawyer. Sawyer "categorically denies" the charge or implication.

Senator Jackson, queried by reporters at the close of hearings, was something less than positive that a leak had been pinned down. He said the record shows there was a "partial naming" of Board a official. Thus, CAB, upon review of the same record, must decide if disciplinary action is warranted against anyone on its staff.

More 'leaks' in CAB cases predicted; they're too big to keep quiet

WHILE the Civil Aeronautics Board is still reeling over the "leak" of its decision last year in the New York-Florida Case, the chances are extremely high that decisions in at least two current cases will become known publicly before an official government announcement can be made (AMERICAN AVIATION May 20, p. 24).

And while the Senate, Justice Department, and perhaps other Federal departments concentrate on investigating "leaks," it may well be that some cases simply got too big or too rich for the procedures under which they're put through the Government mill.

The two which could spill over momentarily are the New York-Mexico City Nonstop Case and the Great Circle Pacific Route Case. Both involve big carriers, rich stakes and bitter feelings. Both have stirred up considerable Congressional interest and both will be finally decided by President Eisenhower. In such cases, the normal CAB procedures of hearings, examiner's findings and oral argument, become incidental and, in some cases, almost superfluous.

The New York-Florida Case, because of the unexpected stock burst the day after CAB voted in much-illumined privacy, has drawn the most attention of any "leaked" decision in recent years.

However, eight years ago, newspapers not only reported freely on CAB's recommended decision to the President in the Pan American-American Overseas Merger Case, but reported also on President Harry S. Truman's "first" decision a week before he changed it. In short, the case was so big, the normal safeguards were totally inadequate.

Two years ago, President Eisenhower's apparently smooth-working executive machinery was upset when premature knowledge of a decision to cancel Northwest Airlines' Hawaiian certificate became available to various members of Congress. Like his predecessor, Mr. Eisenhower came up with a "second" decision and Northwest still flies to Hawaii.

These are recalled by way of illustrating what can and probably will happen in the current major international proceedings.

The New York-Mexico City Nonstop Case is unique in that it involves a head-on clash between Pan American World Airways and Eastern Air Lines for a prize route for which, by international agreement, there can be only one winner.

Pan American is the "crystal clear" choice of CAB Examiner Edward T. Stodola. But Eastern, though lacking the clarity of Stodola's choice, has the backing of an influential block of Southern senators and representatives.

CAB was scheduled to hear oral argument in the case May 29. The agreement with Mexico under which the service at stake may be operated becomes effective June 5. Thus, a CAB recommendation to the President and action thereon by the President can be expected momentarily.

Eastern's Congressional backers reportedly were planning a visit to the

White House to confer with the President. Pan American was expected to counter with Congressional support of its own, plus top-level Cabinet backing.

The vulnerability of a decision in such a case to premature public exposure is thus obvious.

Great circle route case similar

Another proceeding in somewhat the same vein is that involving Pan American's bid to fly the Great Circle route between the U.S. west coast and Tokyo, Japan. The issue is a hang-over from the Transpacific Renewal Case. Northwest Airlines, under a temporary certificate, now flies alone over the Great Circle route from Seattle/Portland to Tokyo. PAA's present U.S.-Japan route is subject to a stop at Hawaii.

PAA has been recommended by a Board Examiner to fly the Great Circle from California, but without privileges at Seattle/Portland. Northwest, meanwhile, has been recommended for permanency on its route.

CAB recommendations on both issues could well be at the White House now, although there is no official knowledge that such is the case. Similar to the line-up in the New York-Mexico Case, there is strong Congressional and Cabinet-level interest.

Thus, CAB has its quasi-judicial fingers crossed as two potential "leaks" are at its doorstep before investigators of the last "leak" have left.

It is CAB's feeling that its new procedure, instituted after the New York-Florida Case fiasco last year, has plugged the leaks in domestic case. That procedure calls for the immediate issuance of a press release announcing the vote in a major case as soon as it's taken.

Thus far, the procedure has worked with success. But whether it has met the acid test of a truly major case remains to be seen. It must always be remembered that a White House press release in the Transpacific Renewal Case two years ago resulted in the President of the United States changing his original decision. Some cases just get too big.

De Havilland Caribou, utility STOL, looms as newest 'DC-3 replacement'

A new contender for the "DC-3 replacement" market appeared on the horizon when the Army placed orders with De Havilland of Canada, Ltd. for five Caribou STOL transports. Deliveries will begin early in 1959.

The 2½-million "evaluation" order was placed by the Army through a special exception to the decree issued by Secretary of Defense Charles E. Wilson limiting Army to fixed wing aircraft of 5,000 lbs. empty weight or less. The Caribou weighs 14,500 lbs. empty.

Test flying of the Caribou designated DHC4, is slated for mid-1958. Development has been under consideration by DH for some time and design studies have been under way for two years.

The Caribou is basically in the DC-3 or C-47 load-carrying class, but with takeoff and landing performance permitting operations from rough, unprepared strips with a takeoff run of 450 feet in zero wind, according to De Havilland.

First models will be powered by two Pratt & Whitney R-2000 engines. A turboprop-powered model is considered practical, DH officials say.

Basically, the DHC4 Caribou is all-weather utility transport aircraft. Primary purpose is use as an army vehicle to provide rapid mobility for troops, equipment and supplies in forward battle areas, and as a commercial transport to offer low-cost transportation of passengers and cargo in undeveloped areas.

DHC4 is designed for takeoff or landing at improvised strips as short as 800 feet in length. Estimated takeoff run is 450 feet with zero wind and 330 feet with 10-mile head wind.

Cabin is unobstructed and loading is through large rear doors. Adjustable ramp and winching facilities provide for rapid loading. Payload is two and a half tons.

Basic design features are considered extensions of those developed in the DH Beaver and Otter types which have been used by the U.S. Army.

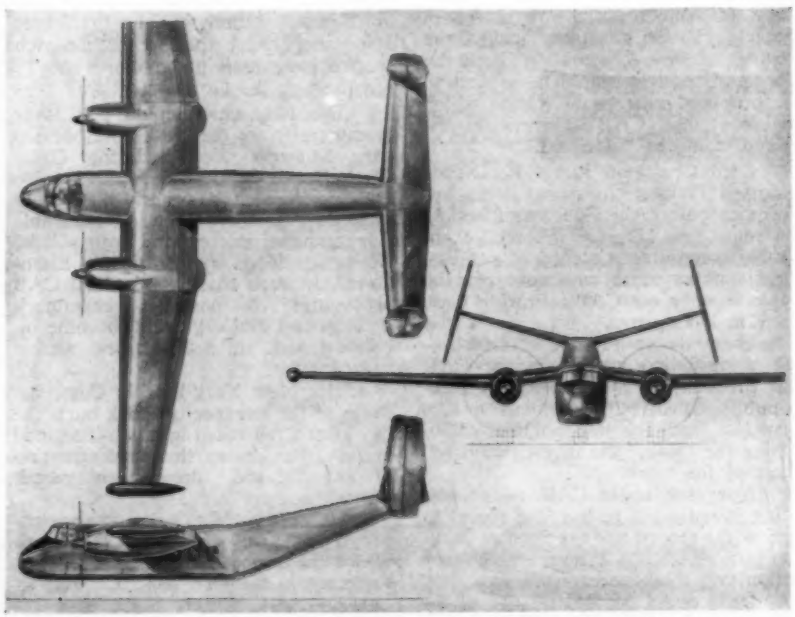
Caribou at a gross weight of 24,000 lbs. will have a passenger capacity of 27 seats. Military arrangement of seats allows 28. Cargo payloads will vary from 6,000 lbs. with fuel for 600 miles to 7,320 lbs. for 200-mile range.

Caribou Specifications

Length	63 ft. 8 in.
Wingspan	95 ft.
Height at tail	27 ft. 9 in.
Wing area	911 sq. ft.
Gross T.O. weight	24,000 lbs.
Empty weight	14,500 lbs.
Passenger capacity	27 seats (utility folding seats) 28 seats (wall type) 22 litters
Cargo capacity	7320 lbs. for 200 miles 6700 lbs. for 400 miles 6000 lbs. for 600 miles

Performance

Cruise speed	185 mph
Landing speed	Less than 60 mph
Takeoff distance	450 ft. (zero wind) 330 ft. (10 mph head wind)
Landing distance	300 ft. (zero wind on dry concrete) 230 ft. (10 mph head wind on dry concrete)
Service ceiling	26,000 ft.
Rate of climb	1580 fpm (sea level)



3-WAY VIEW of De Havilland Caribou, versatile Canadian STOL aircraft.

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Will fares differ for jets and turboprops?

IATA traffic director thinks not; but lower fares could solve problem of piston transports when turbines arrive

by J. W. S. Brancker

IT IS A PECULIAR FACT that many of the comments and criticisms made about air transport policy today fail to accept the background situation as it really is—and is likely to remain—but tend to presuppose a more idealistic state in which merit is always triumphant.

Sad to say, these circumstances do not exist and probably never will. Perhaps it is good that people adopt this attitude, since it shows that optimists still exist. But to disregard the probabilities can cause considerable misunderstanding and either disappointment or loss.

One particular question has arisen recently, and that concerns fares to be charged on turbojet and turboprop aircraft. The view has been expressed—widely, though unofficially—that because turboprops will be cheaper to operate than the purejet, they will automatically enjoy a differential fare in their favor.

Before examining this prospect, it is wise to consider the principles that have governed the establishment of international fares as a whole.

Most inter-government bilateral agreements, which collectively govern virtually all international operations, stipulate that fares must be agreed upon between the carriers concerned; failing agreement, they must be agreed upon between the two interested governments. Through IATA machinery, governments reserve the right to disapprove rates set by the carriers.

Situation must be accepted

Against this background—unless there is a radical and improbable change in attitude among the majority of governments—fares will continue to be handled in this manner. We must accept a situation, therefore, in which fares are both fixed and agreed upon, and cheaper operation does not automatically permit a carrier to enjoy preferential fares.

Some people may feel this is an unfortunate state of affairs, but it is one which exists, and which has been brought about by the circumstances in which air transport grew up.

To make a detailed analysis of historical factors would be inappropriate, but because of early needs for subsidy in many instances and the present implications of prestige and defense, no government will permit its own airlines to be run out of business. It will use whatever means it has at its disposal to keep them in a competitive position.

When IATA began to function after World War II, fares for all types of aircraft were agreed upon at the same level, despite then existent differences in costs of operation and competitive appeal. At the time, this was probably the only practical approach and, as a starting point, was certainly wise. It at least established a workable basis.

In due course, however, it became apparent that some fare differentials were essential to let certain carriers retain a reasonably competitive position. Certain "B" fares were applied to older, smaller, unpressurized aircraft over well-defined and limited routes.

The emphasis was essentially on the competitive element *and not on the differences in the cost of operation.*

Under the circumstances, the carriers, I think rightly, accepted fares at what seemed to be the best practical economic level and did not take into account either the exact costs of each operation or any minor competitive differences in equipment.

Subsequently there has been a slight trend toward granting reduced fares on other classes of equipment which, although competitive years ago, have now fallen behind in the race. But differential fares have remained the exception rather than the rule and the same fares have been charged on most main-line aircraft regardless of type.

True, differences have been made in fares for first-class and tourist service, but this is quite a different problem. And in some special instances, older aircraft used in tourist service have been granted some alleviation from the rigid tourist layout of more modern types, but this was only a temporary expedient to avoid unwarranted expense in conversion of obsolete equipment.

Air transport is aiming at a mass market and it is important that the fare structure remain as simple as possible. And because aircraft fleets are continually being replaced, one carrier may use different types in the same service or may have to replace one type with another at short notice.

In these circumstances, it would be highly impracticable to "rate" individual types as is the case in the shipping industry. It would be impossible for airlines to make fare adjustments for every change of aircraft type, simply because they had been rated differently.

Fare differentials, therefore, have been confined to logical differences in classes of accommodation, with a surcharge system for extra amenities such as berths.

Some may feel that this automatically precludes the public from enjoying benefits which should materialize with use of more efficient aircraft or those which can be operated more cheaply. This, however, is not the case. Even in the shipping industry, a ship is not rated according to its cost of operation, but rather by other factors such as age and speed.

Cheaper vehicle reduces level

In effect, even if only one level of fares for the same class of travel on all types of aircraft is accepted, the introduction of a cheaper vehicle reduces that level.

Why? Because the operator of the cheaper aircraft will naturally strive for rates to match his particular costs, and although he may not find success immediately, pressure of this kind cannot be resisted for long. He will certainly have both political and public opinion on his side. Operating costs are not closely guarded secrets, and the lower costs will control the ultimate level of fares—not the most expensive.

As to fares for jets and turboprops, accepting these past principles, we must first resolve at what stage an aircraft ceases to become competitive. This is important because if both types of aircraft have an equal public appeal, then although there will be no differential, fare levels will tend to follow the costs of the cheaper vehicle.

Operators of the more expensive types are then virtually compelled to accept the lower price range and either compensate for higher costs by good salesmanship and resulting high load factors or, if the gap is too wide, to change equipment or seek other assistance.

It seems the only important competitive element between turboprops and purejets is the question of speed. To the passenger, all other conditions are extremely similar and I suspect that only practical experience will show which will score as far as regularity and

reliability in the long run are concerned.

But the effects of speed vary considerably according to the route being flown. If, for example, we assume empirical speeds of, say, 400 mph for turboprops and 600 mph for jets, while there is an appreciable saving in time over the North Atlantic, this decreases very rapidly for shorter sectors until it becomes virtually negligible for ranges of 300 miles or less.

That time factor

The competitive time element on the North Atlantic will only be about two-and-one-half hours, and in practice, due to such factors as air traffic control, it may well be less. Does this time difference constitute a good enough reason to justify a fare differential? The airlines must ultimately decide this, but it is, in fact, less than that between piston types today and even less than the differences experienced from day to day on a given airplane type due to changes in weather conditions.

It seems unlikely, therefore, that the competitive difference will be considered sufficiently great to secure a fare differential in favor of the turboprop. Moreover, if the principle of a differential were accepted, it would immediately imply the use of two different fares for every class of service over every sector flown.

As already shown, such a structure —while theoretically possible—is extremely undesirable. Of course, the slower the turboprop is in relation to the jet, the greater the case which can be made for a differential. But the technical tendency is not in that direction, and it is only over the longer sectors that the argument can be sustained.

If, in practice, the jet turns out to be appreciably more expensive than the turboprop—and there is little tangible evidence that it will—then there might be a stronger case for claiming a differential, but carriers operating jets would almost certainly prefer to follow a lower rate structure than to grant a differential.

In short-range operations, where the competitive attraction of the two is basically the same, I cannot foresee any differential being acceptable. If, as seems probable, the turboprpop proves to be a better economic proposition over shorter segments, then the level of fares over these sectors will be based on costs of turboprops. If experience shows use of large jets over such routes is expensive, the solution can only be to avoid using them in these operations, unless other reasons make it imperative.

In circumstances where short-sector operations are only a minor part of an otherwise long-sector network, then it may be easier for a carrier to use aircraft somewhat inefficiently for this purpose in lieu of buying a separate fleet to handle a small share of his operation. But he will not be able to insist on a higher fare for this reason.

Broadly speaking, therefore, I do not believe that the turboprop will secure fare differentials in relation to pure jets. If they prove to be much cheaper than the jet, the effect will be to reduce the general rate level. Only if their speed is restricted to a level that is slow enough to give the jet very strong competitive advantage will they be in a position to claim a differential with any chance of success.

Let us be clear, however, that this state of affairs is not going to dampen the success of the turboprop. Cheapness of operation is one of the cardinal factors in securing more traffic, and the absence of preferential treatment cannot alter that fact. In essence, the lowest-cost operation will govern the fare levels.

Fleet changes affect picture

Often overlooked, too, is the fact that each carrier goes through a regular process of changing his fleet periodically. The operator who this year has the newest aircraft finds himself relegated year by year to a lower position as other carriers replace their equipment, until his turn comes round again and he returns to the top of the list.

Fleet changes are progressive and do not coincide with dates on which new rates become effective—nor would it be practical for them to do so. This process whereby carriers introduce new aircraft in rotation tends to equalize the competitive situation over a period of years and makes it less necessary for the less modern types to be protected by fares, unless they are of a type that becomes completely non-competitive.

If we accept the principle of no fare differential between turboprops and jets, we are still faced with the question of how fares on piston aircraft are to be handled. Many of these, particularly the most recent types, have a long, useful life ahead of them. It would be unrealistic to expect them to vanish over the next few years and be replaced completely by turboprops and jets.

Historically, aircraft of good design and performance have remained in service much longer than originally contemplated. Such aircraft cannot be eliminated unless they are physically destroyed. No carrier would willingly destroy assets of this kind and very few could afford to do so.

Moreover, no government will accept a rate structure which renders completely non-competitive a large portion of the aircraft owned by its national carrier.

We are therefore faced with a situation where the new aircraft entering service may well be cheaper in operation and more attractive to the public. Although not a new situation, the only real novelty is that the differences may prove to be more important than in the past. Ultimately, economic pressure will make older types less attractive to carriers, but this is a long-term process and will not happen immediately.

The problem: How to find a fare structure which will permit useful employment of these aircraft without keeping the general level unjustifiably high?

Certain other factors may help to make the problem less acute. When new aircraft are introduced, initial operating costs are usually somewhat higher than the optimum reached as experience is gained. The best financial results, therefore, may not be realized from the jets when first introduced, particularly if airports and navigational aids are not sufficiently developed to permit the highest standards of operation.

During this period, some of the current piston types will reach the stage of full obsolescence and their costs will consequently decline. Others will move further in the same direction. This, of course, is not a solution, but only a palliative covering a limited period. It cannot be used as an excuse for holding fares at a higher level than those possible with the new equipment.

As with jets versus turboprops, it is improbable that any fare differential will be granted in favor of piston transports unless the competitive element is sufficiently large to warrant it. We already have the experience of turboprops and piston types operating com-

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petitively over the same routes, and up to now, time differences have been small. Apart from certain specific cases of "B" class fares, no differentials have been adopted.

Over longer sectors there will certainly be an appreciable difference in speed between the purejet and fastest piston aircraft, and it will be of a greater order than between the jet and turboprop. Time differences, however, will remain small over short ranges. In operation of some older and slower piston types on long stages, this difference may be quite substantial and some kind of fare differential may be justified.

Alternatives suggested

In satisfying this competitive position, there appear to be two main alternatives. Either an actual differential for each class of service could be applied, or a higher standard of comfort at the same fare for each class of service could be allowed in "non-competitive" aircraft.

Again, the disadvantages of the multiple fare structure arise, although this approach may be the only way of dealing with the oldest and least competitive aircraft until they are retired.

It remains to be seen, however, whether carriers will be able to sustain appreciably lower fares on older aircraft, even if this improves their competitive position. If they cannot, they will be forced to confine these aircraft to routes where the time element is less noticeable and where competition is less intense.

In the case of aircraft having performance close to that of the fastest aircraft on the route, it may be better to retain a single fare level and deal with the competitive situation, when it is imperative, by allowing higher standards of comfort on slower types. This has some basis of logic as the longer the journey takes, the more amenities a passenger is likely to consider necessary.

Each aircraft could be dealt with on its merits and in the light of its particular characteristics, but tolerance could be granted, for example, in the case of seating densities. While carriers who claimed such a concession would be put in fair competitive position, they inevitably would be faced with reduced earning power if they used it.

But it is probable that many carriers would not avail themselves of the allowance, and for good economic reasons would continue to use the highest practical seating density for each class of traffic. This has been common practice in the past.

The planned introduction of North Atlantic fares at a level appreciably below those in force for current tourist services, involving higher seating densities and fewer frills, is a development which automatically helps solve the problem. Nonstop operation is not necessary and the cubic capacity and dead weight characteristics of piston aircraft can be economically matched by using very dense seating and intermediate landings.

This is not to say that this very low fare traffic should always be carried on piston aircraft. But it does give considerable scope for the continued use of piston types in conditions where it is at much less disadvantage to the faster jet. These same principles can be applied to other routes where the possibility of shorter staging would permit appreciably increased densities.

I believe a fare structure based on these principles offers a solution to a complex problem and would also retain sufficient simplicity to make it comprehensible and marketable. It can be applied regardless of the final number of classes eventually found necessary. It is not the only solution, nor is it likely to please everybody, but there seems a reasonable chance of acceptance.

If fares are decided on the lines suggested, what effect is this likely to have on the vexed question of whether an operator should use jets or turboprops? I suggest basically very little, except that it might be wise for carriers not to base their thinking on the premise that turboprops will obtain preferential fares in relations to jets.

Speed everywhere is an important commodity, but it becomes infinitely less important where journey lengths of under 1,000 miles are considered. However, in most parts of the world, I suspect the most important factor of all is likely to be cost.

It is low cost plus relatively high speed which will make traffic grow. The fare structure generally will follow the lowest cost level, and it is the carrier capable of providing these two requisites who will score in the long run.

Supplemental carriers form Independent Airlines Assn.

The country's 50-odd supplemental air carriers, split into two camps for most of the past decade, joined to form a new Independent Airlines Association late last month. The new association supersedes Aircoach Transport Association (ACTA) and Independent Military Air Transport Association (IMATA).

IAA plans to look outside its membership for a permanent president. Meanwhile, it elected Jesse F. Stallings, president of Capitol Airways, Nashville, to serve as interim president. Also, Ralph S. Cox, Jr., head of U.S. Overseas Airlines, will serve as chairman of the board of the new group.

Stalling's company was a former member of IMATA. Cox was chairman of the board of ACTA, of which his company was a member.

The new association has a 10-man board of directors made up of the five former directors of IMATA and the five former directors of ACTA. Technically, the corporate structure of IMATA is being retained and ACTA members are moving into that structure under the new name.

Jets to spark boom in tire retreading

More tires, higher landing speeds certain to shorten time between retreads

by Joseph S. Murphy

THE AIRCRAFT TIRE RETREAD BUSINESS, already a million-dollar-a-year operation with today's piston transports, is facing a booming expansion with the advent of jets.

Not only will the landing gears of larger, heavier jets be fitted with double the number of tires, but the higher landing speeds characteristic of the faster jets is virtually certain to shorten tire life between retreads.

As a result, airline bills for new tires and retreads can be expected to increase 100%, possibly more, as the U.S. turbine transport fleet enters full-scale operation in the early 1960s. Faced with this prospect of higher costs, the airlines are certain to intensify their efforts toward getting the most out of every tire carcass through retreading, before it is relegated to the scrap pile.

And some evidence of room for such an intensification is apparent from the wide variety of retread policies in effect among the carriers today. Although acceptance of the retread has been universal among carriers since the early years of World War II, the similarity among airlines ends there.

Retread practices vary greatly

One carrier figures the average aircraft tire can be retreaded up to 13 times. Another pegs the retread limit at 10, whereas a third carrier holds the line at four retreads. Others specify no particular limit, but leave the decision to the retreading agency based entirely on the condition of each individual tire.

Some airlines deal only with the original tire manufacturers in their retread program. Another group divides its business between these manufacturers and independent retreaders. Others deal only with independents in filling retread needs.

There are almost as many combinations of different retread policies and procurement practices as there are airlines. Here's how some of the major airlines face the problem:

American—Four main maintenance bases are authorized to release tires to retread agencies, which include U.S. Rubber, Firestone, Goodrich, Goodyear and Thompson Aircraft Tire Co., the latter an independent retreader.

From installation of a new tire to first retread, AA reports it never gets more than 400 landings from a tire. This range between retreads is from 200 to 300 landings, with an average of about 280 landings for all types of aircraft.

Policy at American limits the number of retreads to four.

Capital Airlines directs most of its retreading to a single independent agency, again Thompson, but in many instances returns tires to their original manufacturer.

Experience at Capital shows the average retread delivers more landings than new tires. Capital estimates it realizes between 300 and 375 landings on new tires and between 375 and 450 landings on retreads. It averages five retreads per tire and keeps the figure at this level primarily because it feels five is the most economical number, not necessarily the safe limit.

Northeast Airlines, also dealing with Thompson for its retread work, sets no limit on the number of retreads allowed, but leaves the decision to the retreader's inspector.

National Airlines, like Capital, figures it gets better service from retreads and estimates they provide about 10% more landings than new tires. NAL averages about 200 landings on a Convair 340 nose tire, up to 400 on a DC-6 main tire and 500 on a Convair main gear installation.

At *Northwest*, retreading is handled with the same four tire manufacturers and one independent used by American Airlines. Policy differs, however, in that NWA allows a tire to be retread 10 times pending a review of the tenth retread.

From this cross-section of airline experience, it is obvious that service gained from retreads is comparable, sometimes superior, to that of initial new tire installations. But the cost of a retread is far less.

Take, for example, the experience of one major trunk airline in a single year's procurement. This unnamed carrier purchased 1,600 new tires costing $215,000 while buying 5,700 retreads at $236,000. The new tire average was $164 and that for retreads only 41.

Another bought 1,026 new tires at $155,367 for an average of $151. During the same 12-month span it processed 4,033 retreads at $163,400 for an average of $40.50.

Safety is hardly the explanation for the wide difference in retread policies among airlines. During the entire three years of operation, 1954 through 1956, U.S. scheduled carriers reported only 20 incidents of a retread failure during takeoff, landing or taxiing.

In this same period, these airlines operated an estimated 15 million takeoffs and landings, or about 750,000 such operations between retread problems.

And with this favorable safety record on the books, the retread tire appears virtually assured of a bigger role in the jet age. Just where this expanded business will go, to the tire manufacturers or independent retreaders, seems to be a controversial point.

For certain, it is no closed business for the tire manufacturers, if the experience of one major trunk airline is any index of a trend.

The problem here, according to its officials, stems from a lack of interest

Tire performance—original versus retread

Detailed service data compiled by Delta Air Lines reflects typical airline experience with original and retread tires on various types of aircraft. Figures are based on average number of landings:

Aircraft/ Position	Avg. No. of Landings Orig. Tire	Retread	Retreads Allowed	Retreads Obtained
DC-7 main L/G	225	230	No Limit	10
DC-7 Nose	273	317	No Limit	7
DC-6 main 1/g	394	399	No Limit	10
DC-6 nose	344	465	. . .	. .
340/440 main 1/g	330	397	6*	6
340/440 nose	305	300	No Limit	13
DC-3 main 1/g	845	797	No Limit	5

* Tire scrapped after sixth retread regardless of carcass condition.

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and energy among basic tire manufacturers toward development of improved retreads. Tire manufacturers are foremost and primarily producers of new tires and have generally resisted the retread programs, they say.

By way of contrast, they point out, the retreader is interested only in retreading, and is constantly striving to produce a better and more reliable product at a lower cost.

Another point raised against the manufacturers is their practice of continuing to force a new tire back in the original mold for retreading, even though these same manufacturers state they cannot control tire growth to less than 3%. Retreaders use various size molds to match tire size and eliminate tire buckles and deformation.

According to the carrier, retreaders also were willing to adopt inflated tire buffing to assure that the retreaded tire is round. In this way, tires which are found out-of-round beyond retreadable limits can be scrapped.

Furthermore, the retreader has established the practice of retreading by replacement of tread only, a practice preferred by the airline as it leaves the original sidewall in view for inspection of the tire in its most critical area. Replacement of sidewall veneer, the carrier is merely camouflaging the condition of the tire.

But whether an enlarged scope of retread business will alter the tire manufacturers' attitude in these areas remains to be seen. Early indications are that it will. At least one of the "Big Four" manufacturers is known to be taking a new look at the situation.

A move by any single firm is certain to touch off a wholesale move by tire makers to support aircraft tire retread programs. This, in turn, can only lead to increased R&D into retread mtehods and a continually improving quality of retread.

To the airlines it will mean a healthier competition in the retread business between tire manufacturers and independents, and this can only result in a better retread product at a lower cost.

Traffic spotty on CAL's new route

Continental Air Lines is developing satisfactory weekend loads on its new Chicago - Denver - Los Angeles route, but weekday loads are not picking up as fast as anticipated.

CAL's success with its new route is being watched with interest because of its experiment in establishing a new route with coach service exclusively. In addition, CAL has introduced a number of added service features and is flying DC-7B equipment.

Denver, CAL's home base, is developing the heaviest loads, as expected. Los Angeles—a hot coach market—is next, with Chicago lagging behind the other two. Most of the traffic is regional, to and from Denver. Ratio of through flights between Chicago and Los Angeles is relatively light, apparently because of the Denver stop despite the DC-7B equipment and the plush service features.

In the Chicago-Los Angeles market, CAL is bucking nonstops of three major carriers, American, TWA and United.

Weekend loads out of Los Angeles are running 50 to 60 passengers, with weekday loads dropping off to 30 to 40, or less than a 50% load factor.

CAL has been up against some handicaps in developing its passenger traffic on the coast. For one thing, it didn't get a downtown ticket office opened until May 23, or almost a month after starting the service.

Despite the relatively slow pickup, CAL sales executives say they are encouraged by passenger reaction to the DC-7B service. "We're getting along pretty well," said Norman Geiger, CAL's west coast sales manager. "It often takes a carrier already established on a route 60 to 90 days to get a new schedule going, so we feel we have no complaint."

CAL is operating two schedules daily over the route with two aircraft. As a result of this tight utilization, it has had occasional schedule delays.

Boeing holds orders for 151 Model 707s

Boeing Airplane Co. has firm orders, announced purchases or letters of notification for 151 model 707s from 13 airlines, President William M. Allen told stockholders recently.

The new total includes sales to two additional foreign airlines. Previously 141 aircraft had been sold to five domestic and six foreign airlines.

The new buyers reportedly are VARIG and Cubana, and it is understood Trans World Airlines has increased its order to 33 of the Boeing jets.

Canadian Pacific to fly new route to Lisbon

Canadian Pacific Airlines has been authorized by the Canadian Air Transport Board to fly from Toronto and Montreal to Lisbon. This will be the carrier's first route to Europe from eastern Canada. It already links Vancouver with Amsterdam via a "polar" route and also flies from Toronto to Mexico City.

CPA opened the new route on June 1 with a twice-weekly DC-6B schedule. Negotiations are taking place to extend the Lisbon route to Madrid.

Customers don't always ring twice

by Eric Bramley

This is an old tune, but it seems to need replaying. On a recent Tuesday morning, which shouldn't be a particularly busy time, we placed calls to the reservations departments of two major airlines. On the first call, we were told that the lines were busy and asked to wait. Two minutes and 15 seconds later the operator informed us the lines were still busy. The call finally went through at 3 mins. 35 seconds. We suggest you try holding your phone for that length of time—it seems like 15 minutes. The second call took 2 mins. 20 seconds. The point is that improvement has been promised in telephone answering time but it doesn't seem to be forthcoming. We know that staffing is a tough problem, but it's going to have to be solved. Reconfirmation and a penalty system are coming soon and they're not going to work unless it's possible to get an airline on the phone.

Through one of those slips that sometimes happens, the accompanying picture ran here in the last issue without a caption, at least for part of the press run. For those who might be curious, it's a truck-mounted loading stand, made by Wollard Aircraft Service Equipment Inc., Miami. This is the first model, and it's been in use by Pan American World Airways for several months at Idlewild. It's mounted on a Dodge pickup truck and is raised and lowered by a hydraulic motor driven off the power takeoff of the truck. Fits any door from 96 to 144 inches high. Joe Wollard, president of the manufacturing company, tells us that PAA is buying some more (for doors 96 to 160 inches) for use with its jet transports.

United Air Lines recently conducted two in-flight surveys to find out something about its passengers. Some of the results are of general interest. Women travelers now represent 30% of UAL's first-class passengers and 54% of air coach travelers in summer; 15% and 30%, respectively, in winter. Most first-class passengers travel for business (70% in summer, 90% in winter). On coach, 60% of summer travel is pleasure, but in winter it shifts to 80% business. In summer, 30% of people on first-class flights are traveling in family groups; in winter, 15%. Family groups are slightly more frequent on coach, especially in summer.

The term "deadhead" is frequently used in the airline business. So now Allegheny Airlines' company publication, "Air Commuter," tells us where it came from. The expression, for someone who gains admittance without paying, is supposed to have started in Pompei, where most theatre patrons couldn't read or write. The free section of the theatre was marked with skulls and those who sat there became known as deadheads.

Sales, Traffic, Promotion

Northwest Airlines is now offering "Imperial Service"—complimentary champagne, reserved seating and other extras to first-class passengers on DC-7C and 1049G Super Connie transpacific flights and on Twin Cities-Washington flights. Champagne is offered before each meal and is in addition to usual beverage service, for which a charge is made. Hors d'oeuvre trays are boarded on every Imperial flight. Miniature Japanese kokeshi dolls are given passengers on Twin Cities-Washington trips. New service was introduced to assure that NWA "gets its share of traffic on highly competitive routes," the company said . . .

Businessmen away from their home offices in need of secretarial services can now charge these services against their **American Airlines** air travel cards. Under an agreement between AA and Manpower Inc., business service organization that maintains offices in most major U.S. cities, the AA travel card serves as a credit clearance. Manpower Inc. later bills the cardholder or his firm . . .

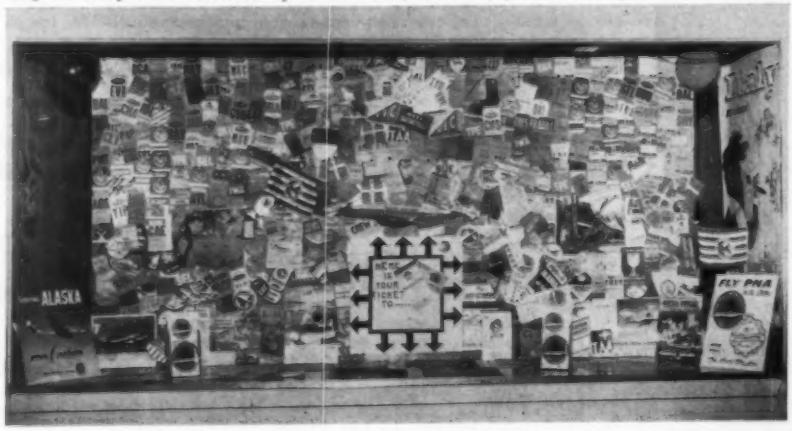
United Air Lines' 1957 sales goal is $315 million . . . **TWA** has transferred the function of reservations from the passenger service department to the sales department . . . TWA's passenger complaints have dropped from 3.5 per 1,000 passengers in the first four months of last year to 2.1 in the same 1957 period. Letters of commendation increased from 1.2 to 1.4 . . .

Riddle Airlines has established a specialized human remains service for funeral directors. New service includes telegraphic notification of all steps in the handling of remains, advance reservations for connections with other carriers, and coordination of transfer facilities at airports . . .

National Airlines, long-time promoter of package vacations to points south, has reversed the field and is offering packages to New York, Boston, Philadelphia and Washington.

Panagra has published a pocket-size 128-page illustrated book, "How to Get the Most Out of Your Trip to South America." Includes complete information on accommodations, customs, currency, shopping, etc., in Panama, Colombia, Ecuador, Peru, Bolivia, Chile, Argentina, Uruguay and Brazil. Available at 25¢ per copy, to cover mailing and handling, from Panagra, 135 E. 42nd St., New York 17, N. Y. . . .

BAGGAGE TAGS from airlines all over the world are included in this unusual display at the Pacific Northern Airlines counter at Anchorage, Alaska, International Airport. They were collected by Ross Wood, PNA's city sales manager.



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TRANSPORT TRENDS

Shrinking profit trend is emphasized by domestic trunklines' first quarter reports. With almost all reports in, net profit after taxes is down 20% from 1956 first quarter. Operating revenues increased almost 14%, but operating expenses jumped more than 21%.

Airlines are taking steps to improve passenger handling when jet transports enter service. For example, Lockheed Air Terminal has entered into an agreement with United Air Lines for installation of a passenger Aerobridge at Chicago's O'Hare Field. Lockheed Air Terminal will design, build and install the Aerobridge and maintain it for one year. Final consummation of the deal is said to depend on approval of the city of Chicago for establishment of this loading device at the airport.

The UAL model is a development of a cargo Aerobridge originally designed for test installations at Travis AFB, Calif., and Tinker AFB, Okla. Both of these are in current use. UAL's is to be a refined version, with pneumatic tires, watertight passageway, etc.

Number of airline "bomb hoaxes" has decreased somewhat. One reason is that they're receiving less publicity. Air Transport Association was told by FBI and by psychiatrists that hoaxes breed publicity which in turn breeds more hoaxes, etc. ATA took its case to press associations and newspapers, a number of whom have cooperated in playing down, or not printing, bomb scares whenever possible.

A $1,000 award will be given by ATA to any airline employe who is instrumental in helping FBI and police apprehend the perpetrator of a bomb hoax. First award went to an American Airlines reservationist in Cleveland who kept a caller on the phone long enough for the call to be traced. Perpetrator was picked up shortly thereafter.

Numerous requests by foreign governments for increased U.S. air route authorizations will receive attention of new Special Senate Subcommittee on Foreign Commerce. Sen. Warren Magnuson (D.-Wash.), chairman of Senate Commerce Committee, heads the group. First consideration will be given to possibility of relaxing trade restrictions with Red China, but the air route question is high on the subcommittee's agenda. Eleven foreign carriers are now "standing in line" for U.S. routes, Sen. Magnuson says.

Supporters of Weather Bureau's plan to establish an in-flight weather reporting service are regarding its demise as a body blow to aviation. Bureau officials earmarked $1,022,000 for the program early in the year. But Congress knocked out the full request, despite the fact that it had full backing of Commerce Dept.

Bill prohibiting serving of alcoholic drinks on U.S. domestic airlines may be pushed through Congress. Some observers say that if bill gets out of committees and comes to a vote, it will pass in House and Senate. Reason: few legislators can afford to oppose an anti-drinking measure.

Arrangement for purchase of an approximate 25% interest in Philippine Air Lines has been made by Pan American World Airways, Manila sources say. Deal is subject to approval of Philippine government, which holds slightly more than 50% of PAL stock. PAA would buy most of 29% stock interest of PAL president Andres Soriano. Two years ago, PAA negotiated to invest about $1 million in PAL by acquisition of 20% of government's interest, but Philippine cabinet turned down the proposal. Since then, there have been recurring rumors that PAL hoped to resume international operations.

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INDUSTRY

State Dept. official defends international air agreements, criticizes U.S. airlines for opposition

The manner in which recent civil air agreements have been negotiated has been defended by a high State Department official.

At the same time, Thorsten V. Kalijarvi, Assistant Secretary for Economic Affairs, criticized the U.S. airlines for their opposition to the Department's actions. The airlines have accused the State Department of following a "giveaway" policy.

Kalijarvi told the International Management Association that in civil air talks "other elements of international relations and foreign economic policy must on occasion be taken into account in deciding what is an equitable route exchange."

If the U.S. wants to continue aviation relations with other countries "we cannot prevent foreign carriers from serving major population centers in the U.S. just because their countries do not have points of equal traffic-generating importance," he said.

"If our aviation policy were to embrace protectionism at home and restrictionism toward foreign operators, the U.S. could no longer hold the line abroad. U.S. policy must take into account the effect it will have on the policies of foreign nations and the retaliatory measures it may produce."

One of the "greatest paradoxes in our international aviation relations is the fact that the U.S. airlines are engaged in international services which are almost entirely dependent upon international air transport agreements—yet these same airlines are often the strongest source of opposition to the conclusion of such agreements . . .

"Now it is noteworthy that despite the added competition of foreign airlines the U.S. airlines in 1955 obtained $225 million in passenger revenue from international services . . . The foreign airlines serving the U.S. obtained only $119 million . . .

"In obtaining international rights beneficial to one carrier, it frequently occurs that the U.S. must grant rights prejudicial to another. Generally speaking, the U.S. airline industry is opposed to the granting of additional rights to foreign operators, but the aircraft manufacturing industry has considerable sums at stake in the foreign airline market and wants to see this market encouraged. Besides, U.S. communities welcome and seek proposed international services by foreign airlines."

Defending the controversial German air agreement, he claimed experience "has proven the agreement to be a good one, and in fact the U.S. airlines have so far enjoyed 13 times more business over the routes exchanged than the German airline, Lufthansa."

Discussing the Dutch agreement, which was opposed by CAB, airlines and members of Congress, he said, "It was up to the Executive to determine what decision would be in the best over-all national interest . . . The Department is convinced that it obtained the most favorable agreement possible, both in the light of foreign economic policy and aviation policy."

Northrop studies employes' latent skills

Northrop Aircraft, Inc. introduced a new latent skills program effective June 1, when all performance reviews covering company personnel — except at the Anaheim division, missile test center in Florida and the engineering department at Hawthorne, Calif.—were accompanied by a latent skill check-list.

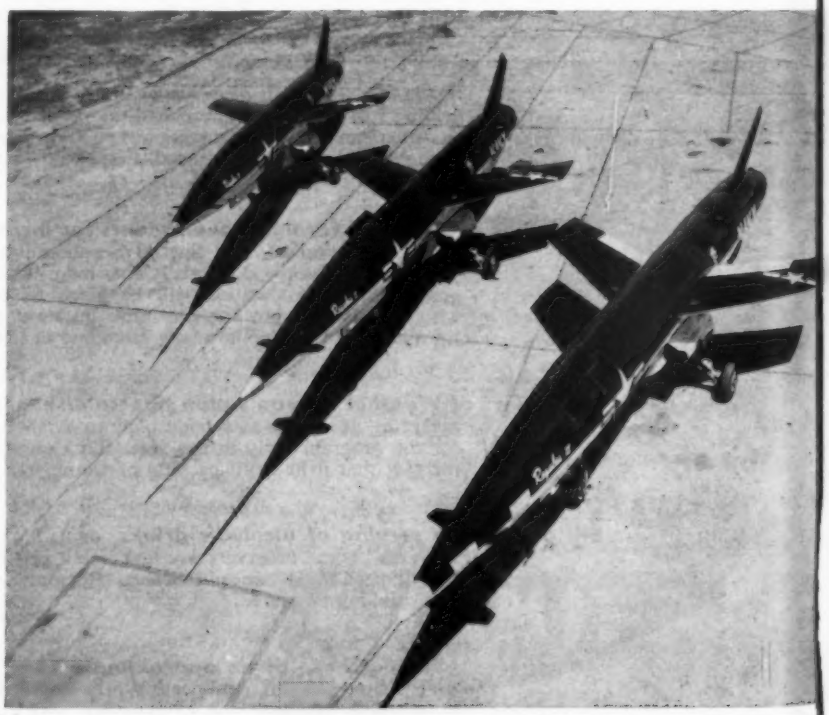
Since individual performance reviews are completed on a semi-annual basis at Northrop, the company's records of latent skills of its workers will be complete by the end of the year. While skills used by the engineering division are not recorded under this program, they are available for quick appraisal by management under a separate program already in effect.

Sperry to produce inertial guidance parts

Sperry Gyroscope Co. is in production on super-precise gyroscopes and other components for inertial navigation of missiles, aircraft and missile-launching Navy vessels.

For close control of atmospheric conditions needed in the production of the new devices. Sperry recently completed construction of a new facility at the company's Lake Success plant in New York. A similar facility is being operated by Minneapolis-Honeywell's Aero division (AMERICAN AVIATION, Feb. 11), AC Spark Plug division General Motors, and North American Aviation Autonetics division.

Sperry is testing inertial platforms over a 1,000-mile flight test range be-



Trio of supersonic Regulus II guided missiles

THREE Navy-Chance Vought Regulus II missiles are shown lined up for test flight at Edwards AFB, Calif. These Regulus II test vehicles are powered by Wright J65; later versions will get more powerful GE J79. This supersonic surface-to-surface missile has flown more than Mach 1.5 and above 50,000 ft.

tween MacArthur Field and Eglin AFB. The U.S.S. Compass is being used to check shipboard systems.

Existence of a new shipboard inertial platform called SINS (Ship's Inertial Navigation System) was revealed recently. According to F. D. Braddon, Sperry's chief engineer, Marine division, present navigation systems are "unsatisfactory" for new atomic submarines capable of "sustained" submergence, and the new tactical uses to which these vessels will be put.

A new tactical use is believed to be underwater and surface ballistic missile launching.

RCA to set standards for AF reliability

Radio Corp. of America has been awarded a contract under which the company will develop industrywide design and reliability standards for various electronic equipments.

The Air Materiel Command contract calls for work on standardization for design of future airborne equipment and establishment of a USAF Reliability Specification and the procedures for its implementation.

Navy rejects proposals for contract training

Navy has apparently irrevocably discarded proposals for primary contract flight training either with separate or joint Air Force contract schools.

Vice Adm. William Davis, chief of Naval operations, said in hearings before the House Appropriations Subcommittee that Navy used civilian contract training during the war because of volume requirements and the experience did not prove satisfactory. The need for carrier indoctrination precluded any comparison with Air Force training, he said.

The Heller report recommended Navy use of contract schools as a cost-saving measure.

Douglas proposes Allison turboprops for DC-7Cs

Douglas Aircraft Co. is setting its sights on extended production of the DC-6/7 series into 1960 with a proposal to install Allison 501 (T56) turboprops on the DC-7C.

The Allison-powered version would probably have a slightly wider fuselage than the present aircraft to permit three-and-three-abreast seating. It would have a clipped wing and cruise at 400 mph.

This aircraft is not the same as the DC-7D which would use Rolls-Royce Tyne engines. The turboprop DC-7C is proposed to compete with Lockheed Electra and discussions are being carried on with United Air Lines.

Other prospects being eyed by Douglas are Northwest Airlines and Pan American World Airways.

Motorola begins work at Phoenix facility

Motorola, Inc. began to move into a new 192,000 sq. ft. military electronics facility last month in Phoenix, Ariz. as a further step toward relocation of its military research and development and production from the Chicago area.

The company has production contracts for missile electronics on the Bomarc, Corporal, Jupiter, Regulus and Terrier missiles, and F-102 and F-104 aircraft. The Bomarc and aircraft work covers development of a data link.

Doman to supply 10 copters to Colombian airline

Doman Helicoptors, Inc. has signed a contract to supply Helicondor de Colombia, Ltda., Bogota, with 10 LZ-5 helicopters. The rotor-craft and spares involved about $2 million and are the first commercial sales for Doman.

First delivery is slated within four months. Delivery of the other nine is being negotiated.

Corning announces new radome material

A new aircraft and missile radome material, an outgrowth of the development of a whole new family of heat-resistant, high-strength materials, was announced by Corning Glass Works, Corning, N.Y.

Standout feature of the material is that Pyroceram, generic name for the new family, can be mass-produced by conventional glass-fabricating techniques such as pressing, drawing, blowing and casting.

Pyroceram was developed from special glasses by adding nucleating agents to the glasses and heat-treating the product. The nucleating agents, such as silver and gold, changed the original amorphous glass to a crystalline material thereby adding strength to the product.

Pyroceram is said to be at least four times stronger than plate glass. Bending strength of some Pyrocerams was given as 37,000 psi, which is substantially maintained up to 1,300°F.

Because of favorable hardness, strength and dielectric properties, Pyroceram is being pilot-produced for radomes.

Corning president William C. Decker said that within the next five years he expected Pyroceram to be used extensively as powerplant materials. This would come about, he said, not only because the new materials would be cheaper than stainless steels but also because Pyroceram has high chemical resistance, low-to-negative coefficients of thermal expansion and high thermal shock resistance.

Grumman wins competition for observation aircraft

Grumman Aircraft Engineering Corp. is the winner of the Navy BuAer competition for a high-performance observation aircraft for Army and the Marines.

Aircraft will be powered by two Lycoming T53 turboprop engines. Navy designation is VOF, Army calls it AO. First flight is slated for 1959.

Northrop sketches details of T-38 trainer

FIRST DETAILED ARTIST'S VIEW of Northrop T-38 reveals area-rule treatment of supersonic Air Force trainer. Student and instructor are seated in tandem arrangement with instructor's seat raised to allow check of student movements and reactions.

BRIEFS

Manufacturing-military

Capt. Iven C. Kincheloe, Jr., jet ace of the Korean War and experimental flight test officer at Edwards Air Force Base, Calif., has been awarded the Air Force's Mackay Trophy for 1956 for "accomplishing the most meritorious flight" of 1956 by a member of the Air Force. He made an altitude- record-setting flight in the X-2 research plane.

Kay Lab stockholders have approved the sale of all assets to **Cohu Electronics, Inc.** In return, Kay Lab received all the stock and assumes all liabilities of Cohu Electronics. Stockholders then approved dissolution of Kay Lab.

Eight manufacturers of general aircraft shipped 608 two-to-10 place utility and executive aircraft during March. Value was $9,558,000.

Radio-Electronics-Television Manufacturers Assn. (RETMA) board of directors has voted to recommend a name change to membership at the annual convention in Chicago. New name would be Electronics Industries Assn.

Frank Pace, Jr., has been elected chairman of the board for Canadair Ltd. He succeeds the late John Jay Hopkins. Earl D. Johnson was elected a vice chairman and L. B. Richardson was re-elected vice chairman. John Urwin was named secretary and treasurer.

Radioplane Co. will become a division of Northrop Aircraft, Inc., later this year. Radioplane currently is a subsidiary of Northrop. Name will remain the same.

Pratt & Whitney Aircraft's J52 jet engine has a 7,500-lb.-thrust rating and is going into production. First use is scheduled for Navy's A4D-2 Skyhawk. Disclosure was made by Lionel B. Clark, P&WA's service school supervisor.

Malcom MacIntyre, a New York attorney, has been nominated by President Eisenhower to the post of Under Secretary of the Air Force. Post was vacated when James Douglas moved up to Air Force Secretary.

Siegler Corp's Hallamore Electronics Division has received a contract for more than $9 million for engineering and production of a high-priority guided missile program. Contract covers electronic test and check-out equipment, reportedly for Martin Titan. Siegler has a $4-million order for similar equipment for Convair Atlas.

Thomas Wolfe has resigned his post as Director for Requirements, Procurement, Distribution and Disposal in the Office of Supply and Logistics for the Defense Department. Wolfe, former president of Pacific Airmotive Corp. and vice president of Pan American World Airways, is reported ready to go into the consulting business in California.

Northern Ordnance, Inc., has received two contracts totaling $23 million for production of Terrier missile launching equipment for carriers Kitty Hawk and Constellation and for a new class of missile frigates, and production of a launching system for the Navy's first nuclear-powered cruiser.

Transport

Air Line Pilots Assn. has returned $314,000 collected in dues to its members. The amount is 17% of dues received. ALPA policy is to return dues as "dividends" to keep net worth at $2.5 million.

Bristol Aircraft, Ltd. has announced that transatlantic service with Britannias will be delayed because of "snags" in testing of the Britannia 310 series.

REAL, Brazilian International Airlines, has ordered three Model 1049H Super Constellations, scheduled for one-a-month delivery beginning in December. Order is valued at $9 million, including spares. Planes will offer "luxury air tourist service" on Buenos Aires-Miami-Chicago run.

CAB Safety Director Oscar Bakke has slated a public meeting June 7 on question of making C-46 aircraft subject to transport category requirements of Civil Air Regulations.

Transocean Corp. of California has acquired Babb Co., Inc., wholly-owned $7-million aircraft subsidiary of Atlas Corp. Atlas will receive $3 million in 14-year 5½% debentures, $3 million in par value 6% convertible preferred stock and 200,000 shares of common stock of Transocean.

Civil Aeronautics Board, needing more time to weigh reconsideration petitions, has indefinitely postponed the effective date of route awards made in the New York-St. Louis nonstop case. Awards, granted to American Airlines, Eastern Air Lines and Trans World Airlines, were to become effective May 31.

Morris M. Townsend, New Jersey financier, has been elected president of Resort Airlines of Delaware, holding company for Resort Airlines (North Carolina), the operating company. He succeeds Clinton Davidson, who moves up to board chairman.

FINANCIAL

Pan American World Airways reports gross revenues of $66,785,000, a record high, during the first quarter of this year. Revenues a year ago were $59,565,000. This year's first quarter showed a loss of $1,494,000 compared to a profit of $2.7 million in the first three months of 1956.

Curtiss-Wright Corp. reports a consolidated net profit of $9,942,256 for the first quarter of 1957. Net sales were $147,427,760. Year ago figures were $9,196,100 on sales of $132,-641,353.

National Airlines had a net income of $2,350,685 for the first quarter compared to $2,847,641 for the same period in 1956. Operating revenues were $18,579,836, compared to $18,624,222 a year ago.

Seaboard & Western Airlines earned $158,711 during the first three months of 1957, giving it the best first quarter in five years. Revenues were $4,836,749, an increase of 34% over last year. Net earnings for 1956 first quarter was $5,676.

United Aircraft Corp. reports net income of $10,967,663 on sales of $297,993,962 for the first quarter. Figures a year ago were $8,701,683 net income, sales of $215,282,597. Backlog March 31 was $2,175,000,000.

Western Air Lines, Inc., reports record first quarter income of $391,162 on operating revenues of $9,362,083. Operating expenses were $8,352,680. Income was entirely from operations whereas 1956's first quarter income of $633,762 resulted entirely from capital gain on sales of retired aircraft.

Eastern Air Lines' net earnings dropped 30% during the first quarter of 1957 while revenues reached an all-time high. Earnings were $3,238,428, compared with $4,613,882 a year ago. Revenue was up to $70,718,656, compared to $61,799,705 last year.

Capital Airlines reduced its operating loss over the first quarter of 1957. Loss at $992,227 compared to deficit of $1,597,736 over same period a year ago. During 1957 first quarter, Capital's passenger-miles increased 64%. Net loss increased to $1,870,171 from $1,043,085, due largely to higher interest charges.

Emery Air Freight Corp. reports a net income of $177,396 on gross revenues of $2,216,487 for first quarter of 1957. Year ago income was $114,-786, revenues $2,072,843.

Northeast Airlines reports a net loss of $237,622 during March and a total net loss of $841,717 for the first quarter. Operating revenues for March amounted to $992,892, for the quarter $2,654,621.

Marquardt Aircraft Co. reports sales for 16 weeks ending April 27 of $11 million, up 110% over a year ago. Net profit amounted to $235,000 for the period. Stockholders have approved an increase in shares from 300,000 to 1 million.

Boeing Airplane Co. reports record sales of $292,711,969 and earnings of $8,075,464 for the first three months of 1957. This compares with sales of $170,879,889 and earnings of $6,156,677 a year ago. Backlog stood at $2.84 billion on March 31. Of this 23% represents commercial sales.

Continental Air Lines has set up a new accounting system to comply with Security and Exchange Commission requirements in connection with registration to sell 230,000 shares of common stock to finance new aircraft purchases. The new system has the effect of reducing 1956 net income and first quarter 1957 net income. First quarter income is now listed as $63,232 rather than the $213,232 announced last month.

CONVAIR 880 jet airliners are scheduled to fly important routes starting in 1959. The 880 is one of more than 40 turbine-powered aircraft types having essential Hamilton Standard equipment. Superior engineering, research, development, and experience stand behind Hamilton Standard's leadership in production for outstanding aircraft—jet or propeller driven.

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Airlines report executives' salaries

Frontier Airlines—C. A. Myhre, pres. & dir., $20,000 salary, no bonus; J. D. Lindsay, vp-traffic & sales, $12,042 salary (up $42), no bonus; E. N. Levin, secy. & dir., $7,800 salary, no bonus; L. P. Blatter, treas., $11,096 salary (up $98), no bonus; E. W. Sexton, Jr., asst. treas., $6,620 salary (up $185), no bonus.

Persons other than directors, officers, and employes who were paid more than $10,000 for personal services during 1956 were: Rippey, Henderson, Kosta, advertising agency, $145,911; Bowen & Scoutt, legal, $32,569; Colin H. MacIntosh, economic consultant, $17,885.

Hawaiian Airlines Ltd.—Arthur D. Lewis, pres. & dir., $29,026 salary (up $5,045), $240 bonus & indir.; Brian Cooke, vp, treas., $17,620 salary (up $3,887), no bonus & indir.; Lionel D. Machado, vp-operations, $17,660 salary (up $1,321), no bonus & indir.; Jack C. Tobin, vp-sales, $20,283 salary (up $16,033), no bonus & indir.; Lambert P. Irons, secy., $10,000 salary (up $10,000) no bonus & indir.; George K. Tanabe, asst. treas. & secy., $10,000 salary, no bonus & indir.; Stanley C. Kennedy, chm. of bd. & dir., no fee, $220 bonus.

Persons other than directors, officers, and employes who were paid more than $10,000 for personal services during 1956 were: Pogue & Neal, Wash., D.C. legal, $12,475.

Mackey Airlines, Inc.—Leonard J. Povey, vp & dir., $9,706 salary, no fee; John H. Popham, secy.-treas. & dir., $9,706 salary, no fee.

Southwest Airways Co.—J. H. Connelly, pres. & dir., $24,833 salary (up $3,833), no bonus; T. R. Mitchell, exec. vp, $15,921 salary (up $1,820), no bonus; A. W. Johnson, vp, treas. & dir., $16,635 salary (up $3,135), no bonus; Raymond Costello, vp-traffic & sales & asst. secy., $12,963 salary (up $3,863), no bonus; Max King, vp-public relations, $9,768 salary (up $768) no bonus.

Persons other than officers and directors paid in excess of $10,000 for services during 1956: Abbott Kimball, San Francisco, advertising agency, $22,552; Bradshaw, Shearin, Redding & Thomas, Silver Spring, Md., legal $23,000.

Seaboard & Western Airlines—R. A. Norden, pres. & dir., $35,000 salary, $16,104 bonus & indir.; A. V. Norden, exec. vp, treas. & dir., $35,000 salary, $16,104 bonus & indir.; C. D. Brell, vp-operations, $25,000 salary, $9,197 bonus & indir.; W. H. Renninger, vp-engrg., $18,000 salary, $9,197 bonus & indir.; W. P. Neth, vp-traffic, secy. & dir., $22,500 salary, $9,197 bonus & indir.; E. O. Schroeder, vp-maint. (joined company 11/56), $3,194 salary, no bonus & indir.; H. Montee, vp, $17,500 salary, $9,197 bonus & indir.; J. H. Rosenwald, asst. secy.-treas., $13,500 salary, $3,450 bonus & indir.; S. I. Fondiller, comp., $14,500 salary, $3,450 bonus & indir.; D. M. Amann, dir., $4,200 compensation.

Persons other than directors, officers, and employes who were paid more than $10,000 for personal services during 1956 were: Lowenstein, Pitcher, Spence, Hotchkiss, Amann & Parr, N.Y.C., general counsel, $39,735; Mel Adams & Associates, N.Y.C., public relations, $25,000; Chapman, Walsh & O'Connor, Wash., D.C., legal, $18,000; Braunstein & Chernin, N.Y.C., auditors, $52,100; Arthur Young & Co., N.Y.C., auditors, $17,800; Hardy Maclay, Wash., D.C., legal, $12,000; and Chas. W. Smith, special traffic consultant, $13,000.

Slick Airways, Inc.—Delos W. Rentzel, chm. of board, $30,000 salary, no bonus & indir.; Robert J. Smith, pres. & dir., $26,667 salary (up $26,667), no bonus & indir.; John E. Mulfeld, vp-sales & traffic, $15,000 salary (up $15,000), no bonus & indir.; Henry P. Huff, vp-operations & maint., $17,337 salary (up $17,337), no bonus & indir.; Herman Ruppel, treas., $12,650 salary (up $12,650), no bonus & indir.; John W. Walbert, secy., $12,600 salary (up $12,600).

Persons or firms other than officers, directors and employes who were paid more than $10,000 for services performed during 1956 were: Steptoe & Johnson, Washington, D.C., legal, $65,000; Price, Waterhouse & Co., auditing services (1955-56), $25,000.

The Flying Tiger Line—Robert W. Prescott, pres. & dir., $42,000 salary (up $3,970), no bonus & indir.; William E. Bartling, vp, $14,400 salary; Fred Benninger, exec. vp and treas., $25,500 salary (up $2,836); L. C. Burwell, vp, $18,000 salary (up $668); George T. Cussen, vp, $15,683 salary (up $1,853); George M. Messenger, vp, $12,000 salary (down $900); L. S. Kimball, vp, $10,350 salary (up $1,050); Frank B. Lynott, vp, $16,500 salary (down $2,967); O. R. Burghardt, secy. & asst. treas., $15,400 salary (up $2,600); John L. Higgins, asst. vp, $14,065 salary (down $889); Ralph B. Stump, asst. secy., $10,688 salary (up $10,688); Samuel B. Mosher, chm. of bd. & dir., $500 dir. fee (up $200).

Persons other than officers, directors, and employes who were paid more than $10,000 for services during 1956 were: Meyers & Batzell, Wash., D.C., legal, $42,000; Arthur Andersen & Co., Los Angeles, audit services, $15,640; Hill, Farrer & Burrill, Los Angeles, legal, $19,311.

Trans-Pacific Airlines Ltd.—Ruddy F. Tongg, pres. & dir., $13,800 salary, no bonus & indir.; David A. Benz, exec. vp & dir., $12,800 salary; no bonus; H. K. Hee, vp & dir., $7,800 salary, no bonus; Jacob Y. Ing, vp & dir., $7,200 salary, no bonus; Richard H. King, vp, $11,858 salary, no bonus; Archie K. Wong, secy. & dir., $3,600 salary, no bonus; Clarence Young, treas., $10,150 salary, no bonus; Harry A. Bowen, asst. secy., $4,200 special fees.

Trans-Texas Airways—R. E. McKaughan, pres. & dir., $25,800 salary, no bonus & indir.; H. E. Erdmann, vp, dir., $13,200 salary, no bonus & indir.; L. J. Eichner, vp, $13,200 salary (up $1,600), no bonus & indir.; M. L. Muse, secy.-treas., $12,800 salary (up $2,200), no bonus & indir.; J. K. Ayer, exec. asst. to pres., dir., $8,200 salary (up $600), no bonus & indir.; W. C. Leatherwood, dir. of pur., dir., $8,200 salary (up $600), no bonus & indir.

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Manufacturing executives' salaries

The following aviation manufacturing firms' executive salaries for 1956 have been listed with the Securities and Exchange Commission:

Aeroquip Corp.—P. F. Hurst, pres., $103,174 (up 23,237); B. A. Main, Jr., vp, $38,688; W. G. English, treas., $30,959.

Air Associates, Inc.—F. W. Godsey, pres., $50,000.

AVCO Manufacturing Corp.—Victor Emanuel, pres. and Chm. of bd., $125,000; J. D. Shouse, vp, $75,000; C. G. Gifford, vp, $70,000; E. R. Piore, vp, $47,277; A. R. Kantrowitz, vp, $45,000; K. R. Wilson, vp, $43,958 (up $11,875).

Beech Aircraft Corp.—O. A. Beech, pres., $99,336 (up $300); J. P. Gaty, vp and gen. mgr., $75,190 (up $288); F. E. Hedrick, vp, $72,990 (up $495); C. C. Pearson, vp, $58,967 (up $136).

Bell Aircraft Corp.—L. P. Faneuf, pres. and gen. mgr., $80,507; R. P. Whitman, 1st vp, $69,696 (up $7,743); H. Gaylord, vp, $60,367.

Bendix Aviation Corp.—M. P. Ferguson, pres., $150,599 (up $7,849); C. Marcus, vp, $94,650 (up $4,350); R. P. Lansing, vp, $87,650 (up $4,350); W. H. Houghton, vp & treas., $82,850 (up $4,350); G. E. Stoll, vp, $82,100 (up $6,225).

Boeing Airplane Co.—W. M. Allen, pres., $117,390 (down $960); W. E. Beall, sr. vp, $80,040 (down $3,465); E. C. Wells, vp, $65,030 (down $2,365); J. O. Yeasting, vp, $49,685 (down $945); F. P. Laudan, vp, $48,040 (down $2,560); J. E. Schaefer, gen. mgr., Wichita Div., $48,040 (down $2,560).

Borg-Warner Corp.—R. C. Ingersoll, chm. of bd., $101,100 (up $100); R. S. Ingersoll, pres., $57,100; E. S. Russey, pres. and gen. mgr. Warner Gear Div., $75,500 (down $500); L. G. Porter, exec. vp, $49,433; R. W. Murphy, vp and gen. counsel, $46,766 (up $6,066); A. Steg, vp and treas., $39,766 (up $7,066); D. E. Gamble, chm. of supervisory bd., Borg and Beck Div., $30,900; G. A. Shallberg, Chm. of exec. comm., $31,100 (down $6,566).

Breeze Corps. Inc.—J. J. Mascuch, pres., $43,000 (up $3,583).

Cessna Aircraft Co.—D. L. Wallace, pres., $75,000 (up $9,000); F. A. Boettger, vp and treas., $49,920 (up $4,920); D. L. Rockam, vp, $46,800 (up $5,550); T. B. Salter, vp, $39,000 (up $1,500).

Chance Vought Aircraft, Inc.—C. J. McCarthy, chm. of bd., $52,475 (down $4,100); F. O. Detweiler, pres., $62,275 (down $5,550); H. B. Sallada, exec. vp, $43,100 (down $3,300); C. E. Burt, vp and controller, $31,916.

Collins Radio Co.—A. A. Collins, pres., $75,505 (up $22,500); R. S. Gates, vp, $55,855 (up $5,550); L. M. Craft, vp, $50,805 (up $6,050); L. E. Bessemer, vp, $33,255; R. T. Cox, vp, $33,203; J. G. Flynn, Jr. vp, $32,653; M. W. Burrell, vp, $30,505.

Continental Motors Corp.—C. J. Reese, pres., $95,505 (down $12,741); H. A. Todd, pres., of subsidiary Wisconsin Motors Co., $79,330 (up $3,500); H. W. Vandeven, treas., $62,150 (down $4,063); A. W. Wild, vp, $60,884 (down $179).

Curtiss-Wright Corp.—Roy T. Hurley, chm. of bd. and pres., $277,190 (up $67,035); G. R. Hill, vp, $129,600 (up $43,423); J. V. Miccio, vp and gen. mgr. of Wright Aeronautical Div., $79,100 (up $22,832); J. G. Byron, vp, $56,733.

Douglas Aircraft Co.—D. W. Douglas, pres., $162,925 (up $397); F. W. Conant, sr. vp, $108,450 (down $68); A. E. Raymond, vp, $76,405 (up $292); D. W. Douglas, Jr., vp, $46,750 (down $43); N. Paschall, vp, $46,750 (up $4,801); P. E. Hines, vp, $38,553 (up $246).

Fairchild Engine and Airplane Corp.—R. S. Boutelle, pres., $120,886 (down $19,930); A. F. Flood, exec. vp and comptroller, $95,196 (down $14,911); W. L. Landers, vp, $80,373 (down $6,982).

The Garrett Corp.—J. C. Garrett, chm. of bd., $81,818 (up $8,967); W. C. Whitehead, pres., $71,822; W. R. Ramsaur, vp, $54,993 (up $5,215); W. D. Morgan, vp, $54,967 (up $7,228); B. N. Snow, vp, $38,023 (up $7,242); M. S. Gelber, vp and secy., $36,551 (up $3,228).

General Dynamics Corp.—J. J. Hopkins, pres. and chm. of bd., $151,151 (down $2,353); F. Pace, Jr., exec. vp, $97,013 (up $3,369); J. G. Notman, sr. vp, pres. and gen. mgr. of Canadair Ltd., $87,850 (down $2,450); J. T. McNarney, sr. vp, pres. of Convair Div., $81,000 (down $14,000); J. V. Naish, exec. vp, Convair Div., $80,750 (down $2,500); R. C. Tait, sr. vp, pres. of Stromberg-Carlson Div., $68,500 (down $4,374); E. D. Johnson, sr. vp, $61,804 (up $17,226); R. B. Watts, vp and gen. counsel, Convair Div., $51,500 (down $2,250); L. J. Gross, vp, $51,000 (down $5,000); L. B. Richardson, sr. vp, $47,211 (down $4,615); A. D. Marshall, vp and secy., $46,000 (up $5,000); R. I. Harris, vp and counsel, $46,000; G. Dean, sr. vp, $36,000.

Greer Hydraulics, Inc.—E. M. Greer, pres., $32,534 (down $6,016); R. P. Lord, exec. vp and treas., $32,534 (down $6,016).

Grumman Aircraft Engineering Corp.—L. R. Grumman, chm. of bd., $76,550 (up $1,975); L. A. Swirbul, pres., $100,000 (up $9,175); W. T. Schwendler, sr. vp, $76,550 (up $1,975); E. C. Towl, adm. vp, $47,850 (up $2,213).

Hoffman Electronics Corp.—H. L. Hoffman, pres., $30,000; M. E. Paradise, vp, $58,500; C. E. Underwood, vp and treas., $58,000 (up $7,500).

Kidde, Walter, and Company, Inc.—J. P. Kidde, pres., $40,000; P. W. Eberhart, vp, $44,478 (up $9,978); W. H. Freygang, pres. of certain subsidiaries, $35,000; V. J. Hill, Jr., vp, $44,478 (up $9,978); D. Mapes, vp, $44,478 (up $11,478).

Lockheed Aircraft Corp.—R. E. Gross, chm. of bd., $125,928; C. S. Gross, pres., $111,835; D. J. Haughton, vp, $89,466; C. A. Barker, Jr., vp, $88,722; C. Chappellet, vp, $84,680 (up $11,192); H. L. Hibbard, vp, $83,880 (up $11,192); C. B. Squier, vp, $60,102.

The Martin Co.—G. M. Bunker, pres. and chm. of bd., $150,000; W. B. Bergen, exec. vp, $66,500 (up $8,167); G. T. Willey, vp, $50,000.

McDonnell Aircraft Corp.—J. S. McDonnell, pres., $73,152 (up $7,065); R. H. Charles, exec. vp, $46,782 (up $5,341); C. W. Drake, vp, $41,396 (up $4,030); K. Perkins, vp, $35,956 (up $3,798).

Minneapolis-Honeywell Regulator Co.—H. W. Sweatt, chm. of bd., $125,000; C. B. Sweatt, vice chm. of bd., $77,500; P. B. Wishart, pres., $125,000 (up $25,000); T. McDonald, exec. vp and asst. secy., $84,167 (up $6,667); A. M. Wilson, exec. vp, $84,167 (up $6,667); J. J. Wilson, vp, $40,000; C. C. Buckland, vp and secy., $34,500.

North American Aviation, Inc.—J. H. Kindleberger, chm. of bd., $168,000 (down $4,800); J. L. Atwood, pres., $124,000 (down $2,000); R. H. Rice, vp, $71,400 (up $2,550); G. B. Brophy, vp, $66,400; R. A. Lambeth, vp and treas., $66,400 (up $3,767); J. S. Smithson, vp, $66,400 (up $3,767).

Northrop Aircraft, Inc.—W. C. Collins, pres., $85,000 (down $39,583); K. P. Bowen, vp, $53,927; E. Schmued, vp, $47,000 (down $21,042); R. J. Pagen, vp and treas., $41,750 (down $19,042); W. C. McDuffie, chm. of bd., $35,000 (down $14,583).

Piper Aircraft Corp.—W. T. Piper, pres. and chm. of bd., $38,135.

Republic Aviation Corp.—M. I. Peale, pres., $116,165 (up $4,141); W. G. Bain, vp and gen. mgr., $61,400 (up $2,415); A. Kartvell, vp, $61,700 (up $2,847).

Rheem Manufacturing Co.—R. S. Rheem, chm. of bd., $95,400 (down $24,890); D. L. Rheem, vice chm. of bd., $95,400 (down $24,890); A. L. Walker, pres., $45,600 (up $6,704); C. V. Coons, exec. vp, $40,000 (down $4,106); G. M. Greenwood, vp, $40,860 (down $10,660); W. E. Zander, vp, $37,145 (down $14,375); W. S. Rheem II, vp, $31,583 (down $4,376); J. J. Hall, vp, $33,750.

Rohr Aircraft Corp.—F. H. Rohr, chm. of bd., $85,000 (up $545); J. E. Rheim, pres. and gen. mgr., $60,000 (up $383); B. F. Raynes, vp, $31,872 (up $172).

Ryan Aeronautical Co.—T. C. Ryan, pres., $50,000 (down $5,000); G. C. Woodard, exec. vp, $42,500 (down $2,500); L. M. Limbach, vp, $32,550 (up $1,675).

Temco Aircraft Corp.—R. H. McCulloch, pres., $84,500 (up $4,350); H. L. Howard, exec. vp and treas., $65,000 (up $2,600); J. A. Maxwell, Jr., vp and gen. mgr. Dallas Div., $40,000 (up $1,350); I. N. Palley, vp, $40,000; C. Williams, vp and comptroller, $40,000 (up $1,350).

Thompson Products Inc.—F. C. Crawford, chm. of bd., $166,500 (up $11,050); J. D. Wright, pres. and gen. mgr., $151,700 (up $10,200); B. W. Chidlaw, vp, $84,000; L. M. Clegg, vp, $60,900 (up $200); A. T. Colwell, vp, $91,600 (up $6,400); J. H. Coolidge, vp, $91,450 (up $6,150).

United Aircraft Corp.—H. M. Horner, pres., $185,950 (up $250); W. P. Gwinn, vp and gen. mgr., Pratt & Whitney Aircraft Div., $155,219 (up $29,639); L. S. Hobbs, vp, $152,700 (up $12,700); W. R. Robins, vp and controller, $121,440 (up $640); F. B. Rentschler, vp, $39,036.

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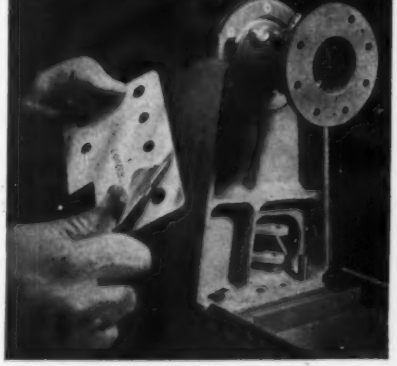

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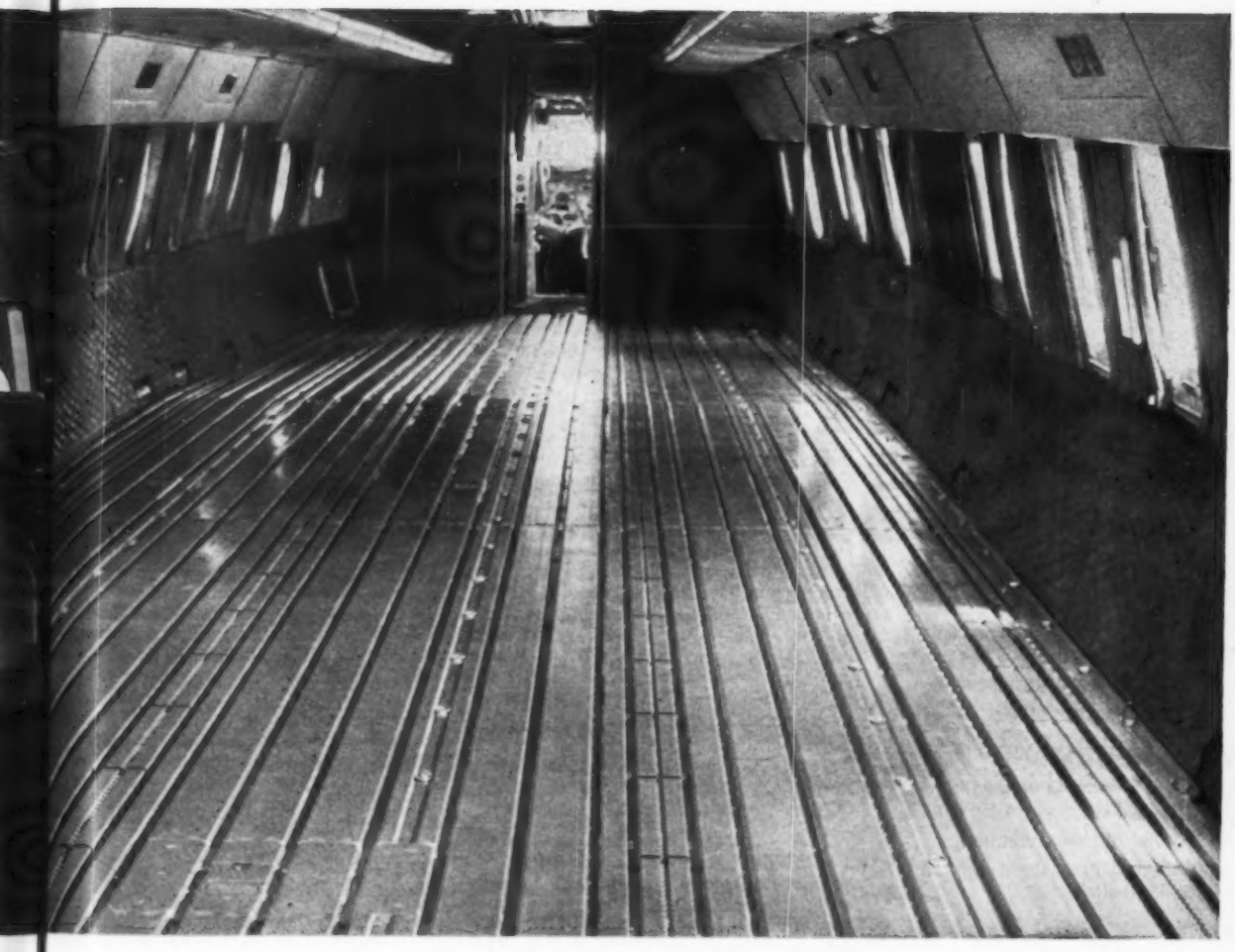

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WEST COAST TALK

by Fred S. Hunter

Some plain questions and some plain answers about planes and such

THE MAIL:

Q—Was the Bell X-1A or the Bell X-2 the first plane to reach a speed of Mach 2?

A—First plane to do it was the Douglas D-558-2 Skyrocket, with Scott Crossfield piloting on a test flight for NACA. Crossfield, it might be added, will be marking up some new Mach numbers to his record in another year or so. These will be accomplished with North American Aviation's upcoming X-15 research plane on which he is the project pilot.

Q—Is the Air Force-Lockheed F-104 or the Navy-Chance Vought F8U the fastest military aircraft flying today?

A—We wouldn't want to start any arguments, but, strangely enough, it just might be an airplane the Air Force has decided it doesn't want, the North American F-107. All three aircraft—reputedly—are in the Mach 2 category, but it's our guess the F-107 is more consistent in working up to Mach 2.1 or possibly even Mach 2.2. Without losing altitude, that is.

Q—Would you say that the Lockheed Electra, selling at less than $2,000,000 to the airlines, is underpriced?

A—Yes and no. It's true that Lockheed's breakeven point on its new propjet transport is very high, about 400 airplanes. Sales to date are a long way from this goal. Unless Lockheed makes many more sales, the Electra will show a substantial loss. From this standpoint, therefore, you can say the Electra is underpriced. On the other hand, a higher sale price would reduce —possibly even impair—the airplane's advantageous economies in competition with other turboprops, such as the Viscount or Britannia. So from a market standpoint the Electra is not at all underpriced. If Lockheed can sell as many Electras as it has Constellations—and why not?—Lockheed stockholders need have no worries, only a little patience.

Q—Where is the longest runway in the United States?

A—Tucson Municipal Airport's is the longest civil airport runway, 12,000 feet. It apparently intends to retain this distinction because plans are afoot to extend it to 15,000 feet. (Jet age.) Edwards Air Force Base, site of the Air Force Flight Test Center, has a 15,000-foot concrete runway, but its dry lake surfaces run for miles.

Q—In view of all the reports on the superior performance of the F8U, isn't it a little surprising that the Navy selected Grumman F11Fs for the new airplanes for the Blue Angels?

A—The F8U is too big and too heavy. It wasn't designed for precision acrobatics such as those demonstrated by the Blue Angels. The F11Fs fit this pattern.

Q—I keep hearing reports the Boeing 707 will benefit from the flight-test program on the KC-135 tanker. How can the test work on a military airplane, like the KC-135, be applied to a purely commercial airplane, like the 707?

A—Here is a current example. The Air Force will conduct full-scale icing tests on a KC-135, using a "spray" airplane as a source of ice. The Air Force will be glad to have the CAA participate in these tests. This will provide the CAA with data it can apply to the 707 and Boeing may not have to go chasing off to Alaska and points north—at $500 per hour or thereabouts —to find ice to meet CAA conditions.

Q—What's the Air Force doing with its old B-36s?

A—Selling 'em for scrap. Planes being disposed of, however, are only those earlier models which cannot be modified to current operational configuration. There are supposed to be 127 of these aircraft sold as surplus. A condition of their sale is they must be destroyed on the spot at Davis-Monthan Air Force Base in Arizona.

Q—The other day I saw a Flying Tiger Constellation at the Lockheed airport with a chunk of concrete hanging from its nose. How come?

A—Lockheed didn't include a tail stand for the Model 1049H so the Tigers used the weight of a concrete block to hold the nose down while loading heavy articles in the aft section of the plane. Lockheed, however, has since designed a tail stand for the Model 1049H.

13 more VISCOUNTS ordered by TRANS-CANADA AIR LINES

Mr. Gordon McGregor, President of Trans-Canada Air Lines, announces that TCA is adding thirteen new Vickers Viscounts to their fleet. Since their initial order for 15 in November, 1952, TCA's total Viscount fleet now on order stands at 51—of which 25 have already been delivered. Mr. McGregor says, "In my opinion the Vickers Viscount is by a very wide margin the best commercial aircraft of its class that has ever been built."

Why TCA bought more Viscounts...

In TCA's first year of Viscount service, its over-all load factor rose to a record 81%. And in more than two years of service, the Viscount's load factor has averaged over 80%.

The Viscount contributed considerably toward the outstanding operating record chalked up by TCA for 1956. Passenger revenues were up 22%, gross income up 18% over 1955, net income up to $1,500,000.

TCA learned what so many other airlines have also learned: "*wherever the Viscount flies . . . traffic figures rise.*" Result: over 30 airlines have ordered Viscounts—and, of the 15 now operating Viscounts, 10 have already increased their orders.

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MORE ABOUT BRISTOL'S "WHISPERING GIANT"

Noise-level tests prove that t

World's largest, fastest, quietest turboprop airliner reduces noise levels to a new low

Official noise-level tests at a large international airport have underlined the amazing quietness of Bristol's Whispering Giant. With a ground noise-level of 81 decibels when taking off, the Britannia was 50 decibels quieter than jet transports flying today, 20-25 decibels quieter than current four-engined airliners . . . and quieter even than twin-engined airliners.

The Britannia carries up to 133 passengers at amazingly low operating costs. She is the world's most versatile airliner because she maintains her matchless standards of efficiency and economy from the longest trans-polar flight to short inter-city runs.

Powered by four 4120 h.p. Bristol Proteus turboprop engines, the 175,000-lb. Britannia cruises at a guaranteed 400 m.p.h. with all the smoothness and whispering luxury associated with turboprop flight.

the Britannia WHISPERS!

The Britannia has been more thoroughly pre-operationally tested than any airliner ever before. Her structure has undergone over 54,000 simulated flying hours in a pressure tank . . . while her engines have been proved in more than 74,000 flying and bench hours.

She is the latest product of a company long renowned for progressive ability, achievement and reliability in aviation techniques.

The Britannia has met with worldwide recognition and demand. She is now in commercial service with British Overseas Airways Corporation and has also been ordered by Northeast Airlines, Canadian Pacific Airlines, El Al Israel Airlines, Hunting-Clan Air Transport, The Royal Air Force and The British Ministry of Supply.

BRISTOL

Britannia

BRISTOL AIRCRAFT LIMITED • ENGLAND

Summary of U.S. airline traffic for March, 1957 vs. March, 1956

Compiled by American Aviation Publications from Official C.A.B. Data

Airlines	Revenue Passengers (In Thousands)			Revenue Passenger Miles (In Thousands)			Total Ton-Miles Rev. Traffic			% Available Ton-Miles Used	
	1957	1956	% Change	1957	1956	% Change	1957	1956	% Change	1957	1956
DOMESTIC											
American	621,298	590,752	5.2	401,876	355,514	13.0	47,989,801	42,936,573	11.8	57.0	60.26
Braniff	167,808	154,177	8.8	70,413	60,329	16.7	7,465,192	6,460,264	15.6	46.7	54.68
Capital	303,743	215,186	41.2	115,149	67,995	69.3	11,830,708	7,232,544	63.6	46.0	45.92
Continental	63,579	58,589	8.5	23,312	20,933	11.4	2,441,015	2,218,539	10.0	46.8	46.88
Delta	233,463	207,784	12.4	121,911	103,617	17.7	12,956,586	11,149,542	16.2	57.0	62.52
Eastern	714,800	660,395	8.2	442,180	381,396	15.9	45,495,659	42,289,332	7.6	45.7	55.64
National	156,853	152,218	3.0	111,400	116,438	—4.3	11,794,373	12,881,010	—8.4	53.2	76.11
Northeast	43,761	32,969	32.7	11,239	6,623	69.7	1,153,456	658,076	75.3	36.5	56.49
Northwest	100,325	101,272	—0.9	64,888	61,391	5.7	7,565,379	7,326,833	3.3	48.1	51.67
TWA	344,849	321,590	7.2	255,071	232,369	9.8	28,517,718	25,988,279	9.7	52.2	55.31
United	472,260	495,421	—4.7	339,596	323,352	5.0	39,873,892	38,363,640	3.4	53.1	57.73
Western	106,882	18,893	[1]	51,518	9,043	[1]	5,484,572	961,602	[1]	58.2	55.86
TOTALS	3,329,621	3,009,246	10.6	2,008,553	1,719,000	16.8	222,568,351	198,466,234	12.1	51.3	57.6
TERRITORIAL SERVICE											
Caribair	22,148	18,418	20.3	1,593	1,364	16.8	173,727	130,862	32.6	61.3	57.7
Hawaiian	29,892	28,775	3.9	4,567	4,012	13.8	509,735	487,755	4.5	56.9	51.7
Trans-Pac.	11,656	13,191	—11.6	1,696	1,666	1.9	146,700	137,858	6.4	55.3	49.9
INTERNATIONAL											
American	13,288	12,164	9.2	10,260	9,114	12.6	1,454,800	1,235,048	17.8	73.1	79.64
Braniff	3,323	2,616	27.0	6,762	5,786	16.9	840,660	785,560	7.0	55.7	53.55
Delta	5,949	4,968	19.7	6,544	5,067	29.1	807,830	595,908	35.6	51.1	47.29
Eastern	23,096	16,198	42.6	30,718	22,433	36.9	3,346,738	2,572,287	30.1	56.5	57.49
National	7,692	11,526	—33.3	5,361	7,281	—26.4	608,159	790,966	—23.1	49.8	78.76
Northwest	8,720	7,868	10.8	19,704	16,949	16.3	3,835,217	3,673,885	4.4	67.1	69.43
Hawaiian	1,436	NA	....	3,868	NA	....	435,241	NA	....	60.9	NA
Panagra	12,273	12,599	—2.6	16,582	15,497	7.0	2,173,087	2,087,456	4.1	64.8	62.88
PAA											
Lat. Amer.	115,931	102,426	13.2	100,582	83,395	20.6	14,550,935	11,933,847	21.9	66.2	62.51
Atlantic	74,594	71,835	3.8	105,125	83,466	25.9	14,613,639	11,839,924	23.4	63.8	63.36
Pacific	23,195	23,093	0.4	94,832	66,843	41.9	12,755,081	9,733,694	31.0	72.4	71.21
Portland/Seattle-Honolulu	2,182	NA	....	6,755	NA	....	724,610	NA	....	57.0	NA
Alaska	4,496	5,319	—15.5	5,047	7,206	—29.9	734,994	1,064,843	—30.9	45.0	53.61
TWA	17,431	19,270	—9.5	43,711	49,584	—11.8	6,227,266	7,003,305	—11.1	69.5	66.25
United	6,796	6,628	2.1	17,474	16,444	6.3	1,958,382	1,882,994	4.0	55.6	59.34
TOTALS	316,786	296,510	6.8	462,702	389,065	18.9	63,906,788	55,199,717	15.8	65.3	64.5
LOCAL SERVICE											
Allegheny	31,660	25,425	24.5	5,468	4,088	33.8	558,846	414,934	34.7	41.8	44.6
Bonanza	12,647	10,273	23.1	2,800	2,187	28.0	280,660	218,981	28.2	46.1	39.9
Central	8,878	10,261	—13.5	1,729	1,713	0.9	179,527	175,090	2.5	26.7	30.8
Frontier	16,280	15,907	2.3	4,502	4,888	—7.9	519,843	549,405	—5.4	54.6	62.9
Lake Central	12,265	10,344	18.6	1,972	1,561	26.3	202,003	157,614	28.2	40.4	34.1
Mohawk	32,947	24,328	35.4	6,133	4,355	40.8	617,176	436,427	41.2	49.0	56.2
N. Central	52,141	38,457	35.6	8,281	5,679	45.8	836,572	589,845	41.8	51.7	44.3
Ozark	30,055	24,483	22.8	4,711	3,671	28.3	484,891	367,528	31.9	40.7	35.8
Piedmont	30,608	30,909	—1.0	6,154	5,743	7.1	623,179	586,997	6.2	50.2	49.5
Southern	17,524	16,140	8.6	3,117	2,851	9.3	318,426	293,343	8.6	44.5	44.2
Southwest	24,922	20,024	24.5	5,361	4,150	29.2	530,505	416,824	27.3	49.8	45.5
Trans-Texas	21,451	17,718	21.1	4,814	3,997	20.4	503,655	421,653	31.3	37.2	36.4
West Coast	18,820	17,145	9.8	3,396	3,088	10.0	335,312	300,569	11.6	43.7	54.3
TOTALS	310,198	261,414	18.7	58,438	47,971	21.8	5,900,595	4,929,210	21.5	45.0	44.7
HELICOPTER SERVICE											
Chicago (HAS)	1,752	.....	....	28	.....	....	5,257	2,279	130.7	41.6	41.79
Los Angeles	2,150	1,296	65.9	80	62	29.0	13,876	11,775	17.8	59.1	52.15
N. Y. Airways	4,799	2,545	88.6	89	46	93.5	11,664	6,836	70.6	40.2	56.54
ALASKAN SERVICE											
Alaska [2]	241	365	—33.9	375	563	—33.4	233,118	230,755	1.0	37.8	31.9
[3]	4,300	2,966	44.9	1,327	795	66.9	305,898	375,981	—18.6	50.2	46.8
Alaska Coastal	3,225	2,573	25.3	290	268	8.2	36,401	35,336	3.0	63.6	65.9
Cordova	1,392	1,379	0.9	412	232	77.6	110,438	97,826	12.9	46.9	80.2
Ellis	3,332	3,131	6.4	221	158	39.9	26,660	19,993	33.3	66.3	62.7
Northern Consol'd.	1,574	1,573	0.1	420	360	16.7	133,457	741,560	—82.0	58.0	91.5
Pacific Northern	6,098	1,921	217.4	5,484	373	1370.2	833,208	72,525	1048.9	50.8	60.7
Reeve	377	248	52.0	322	149	116.1	62,753	36,851	70.3	50.0	57.3
Wien Alaska	1,377	1,683	—18.2	411	816	—49.6	396,860	884,500	—55.1	83.6	92.6
TOTALS	21,916	15,839	38.4	9262	3714	149.4	2,138,793	2,495,327	—14.3		

[1] *Reflect 74-day strike; operation resumed March 24, 1956.*
[2] *State—Alaska Route.*
[3] *Inter-territorial Route.*

FACILITIES

Jeppesen & Co. has opened an office at Frankfurt, Germany. Publication of a European Edition of the Jeppesen Airway Manual was started June 1 to mark the beginning of the European expansion.

General Electric Co. has added production facilities to the Missile and Ordnance Systems Department. The department has acquired existing GE facilities at Burlington, Vt. About 400,000 sq. ft. has been added, with 1,600 persons employed on the premises.

Litton Industries will build a 60,000-sq. ft. plant employing about 600 persons at Salt Lake City. This will be the 11th Litton plant location.

Elgin National Watch Co. will construct a research and development plant in the Los Angeles area to handle expanding operations of its Micronics Division. A 20,000-sq. ft. building to be constructed in the Canoga Park Industrial section is scheduled to be occupied September 1.

Radiation, Inc. plans to double its present size in two years. New stock has been issued to finance the expansion. Plants are located at Orlando and Melbourne, Fla., and employ 750 people.

Hitemp Wires, Inc. has begun construction of a 31,000-sq.-ft. plant at Westbury, N. Y. Facility will coat wires and cables with high-temperature insulations.

Aeronutronic Systems, Inc., has opened a research and development facility at Glendale, Calif. The 10,000-sq.-ft. structure will be used as an experimental shop.

Washington Technological Associates, Inc., has broken ground for an engineering and laboratory building at Rockville, Md. It will be WTA's second building.

Leach Corp. has opened a $250,000 addition to its Leach Delay Division. The 15,000-sq.-ft. structure brings total area of facilities to 50,000 sq. ft.

Where do you belong in IBM Military Products?

Systems Design Engineer: Before his recent promotion, this man formulated advanced concepts of configuration, capabilities, and operational features, and coordinated the design of radar, computer and inertial equipments for optimum integration as a system. Engineers interested in military systems, computers or servo applications will find opportunities in error analysis, ballistics, reliability, and electromechanical, servo and equipment interconnection design. *Could you handle his responsibilities?*

Test Equipment Engineer: Also promoted recently, this man formerly developed test sets of advanced design, requiring precision electronic measuring circuits and mechanisms meeting military specifications. He started with specification requirements and carried designs through model testing by electronic and mechanical engineers. This activity includes application of servo-mechanisms, packaging of precision components, and liaison with sub-contractors in many fields. *Could you handle his responsibilities?*

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Organized only 22 months ago, IBM Military Products Division has grown enormously, opening up opportunities to engineers and scientists in all these fields:

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- Mechanical Design
- Optics
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- Power Supplies
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At the new plant and laboratory in Owego, N. Y., IBM designs and manufactures advanced airborne analog and digital computers for Air Force bombing-navigational equipment. At the new Kingston, N. Y., facilities, IBM builds the world's largest electronic computers for Project SAGE, part of our nation's giant defense net.

The electronic computer field offers one of the best ground-floor career opportunities today. Economic experts rank the electronic computer in importance with automation and nucleonics in growth potential. Sales at IBM, the recognized leader in the field, have doubled, on the average, every five years since 1930. Engineering laboratory personnel quintupled in the past five years. Future expansion plans offer even better opportunities. As a member of IBM Military Products, you enjoy the stability and security of the IBM Corporation, plus the opportunity to progress in any other IBM division. Promotions open up frequently from continuous growth. The "small group" approach assures recognition of individual merit. Salaries are excellent and company benefits set standards for industry.

For the facts about an engineering career with IBM Military Products Division, please write to:

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PEOPLE

Croll Hunter (left), chairman of the board of Northwest Airlines, was honored recently on completion of 25 years service with the company. President Donald W. Nyrop is shown presenting a 25-year pin to Mr. Hunter, who joined Northwest in 1932 as traffic manager. He became vp-general manager a year later and served as president from 1937 to 1953 when he became board chairman. Leonard S. Holstad, comptroller, also received a 25-year pin during the ceremony.

Rt. Hon. C. D. Howe (center), minister of defense production, Air Marshal Roy Slemon (left), chief of air staff of RCAF, and K. R. Patrick, president and managing director of Canadian Aviation Electronics Ltd., watch flight of CAE CF-100 flight and weapons system simulator during acceptance ceremonies of first 11 production models.

LEE S. JOHNSON (below) gen. mgr. of Sikorsky Aircraft division of United Aircraft Corp., has been elected a vice-president of the corporation. He joined Sikorsky in November 1955, became general manager last January 1. Prior to that he was executive assistant to the gen. mgr. of Pratt & Whitney Aircraft division of UAC.

Willis

Burton

CHARLES F. WILLIS, JR., is new president and a director of Alaska Airlines. He succeeds Nelson David, resigned. Willis, a World War II Navy pilot, was special assistant to President Eisenhower 1953-55, resigning to become assistant to board chairman of W. R. Grace & Co.

LUCIUS W. BURTON has been named director of planning and development of Civil Aeronautics Board, a new position. He will provide direction for CAA's Technical Development and Evaluation Center, Indianapolis, and co-ordinate with R&D and planning organizations of the military as well as other agencies.

DON R. BERLIN (below), president of Vertol Aircraft Corp., cuts ribbon on 500th H-21 helicopter delivered to the armed services. Maj. Gen. George R. Acheson, commanding general of Middletown Air Materiel Area is at left. H-21s are in service with Air Force, Army, RCAF and French and West German governments.

GAYNER

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OBERG

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MANUFACTURING

Name	New Position	Former Position
Raymond D. Gayner	Mgr. engrg. oper., North American Aviation, Inc.	Chief project engr.
H. J. Chase	VP and base mgr., Lockheed Aircraft Service-International, Inc.	Base mgr., Idlewild
C. D. Oberg	Dir. sales, Solar Aircraft Co.	Mgr., aircraft and engine component sales
Baboo Ram Teree	VP-engrg. and mfg., Greer Hydraulics	Chief engr. and mgr. engrg. and mfg.
Philip A. Scheuble, Jr.	Gen. mgr., Vapor Heating Corp., Vap-Air Div.	Administrative engr., A. O. Smith, Milwaukee
Clarence W. Miles	Gen. counsel, The Martin Co.	Head, Miles & Stockbridge
Armand G. Manson	Asst. dir. pub. rel., Bell Aircraft Corp.	Pub. rel. staff
Charles S. Ames	Chief project engr. for Atlas ICBM, Convair-Astronautics	Chief design engr. ICBM
Turpin Gerard	Test pilot, Bell Helicopter Corp.	Chief pilot, Doman Helicopters
Robert Lynn	Chief research engr., Bell Helicopter Corp.	Project engr. HSL-1
Davis Hutchinson	Chief engr., Wyle Mfg. Corp.	Sr. project engr., Century Engineers
Edward C. Wagner	Asst. to vp-engrg., Ford Instrument Co.	Engrg. dir. for marine equipment
Willard B. Paine	Exec. vp, Bendix-Westinghouse Automotive Air Brake Co.	Gen. mgr., Kansas City Div., Bendix Aviation Corp.
I. F. Richardson	Gen. mgr., Kansas City Div., Bendix Aviation Corp.	Asst. gen. mgr.
Richard H. Hall	Mgr. Pacific Div., Mycalex Corp. of America	Commercial engr.
Maj. Gen. Raymond C. Maude (USAF, Ret.)	VP-govt. operations, Allen B. Du Mont Laboratories, Inc.	
A. E. Abel	Gen. mgr., Radio Div., Bendix Aviation Corp.	Gen. mgr., Govt. Div.
Bill Haworth	Mgr. news bureau, Bell Helicopter Corp.	Asst. gen. mgr.
Henry W. Zimmer	Chm. of bd., Kawneer Co.	Pub. rel. dir., Texas Empire Investment Corp.
Arthur E. Miller	Dir. research, Scott Aviation Corp.	Exec. vp
Clarence M. Leeds	VP-mfg., Simplex Equipment Corp.	Chief engr.
Robert W. Murphy	Chm. exec. committee, Borg-Warner Corp.	VP, Air Associates, Inc.
Joseph Holland	Dir. field service, AC Spark Plug Div.	VP and gen. counsel
Moreton Price	Military Sales mgr., AC Spark Plug Div.	Sales mgr.
Duane M. Mayhew	VP-sales and a director, Victoreen Instrument Co.	Sr. liaison engr., Los Angeles
Richard B. Fialho	Project mgr., B-52 program, Aeronca Mfg. Corp.	Gen. sales mgr.
Martin Elander	VP-finance, secy. and treas., United Aircraft Products, Inc.	With Ford Motor Co.
Granville L. Conrad	Chief engr., R&D Div., Continental Motors Corp.	Secy. and treas.
Edgar Allen Goff, Jr. (Lt. Col. USAF, Ret.)	Asst. to pres., Link Aviation, Inc.	Asst. chief engr.
John Carter	Pres., Fairchild Camera and Instrument Corp.,	Commanding officer, Flight Service Squad. Wright Patterson AFB
Dr. Charles M. Askey	Scientific staff, Hayes Aircraft Corp.	VP and gen. mgr., New Products Div., Corning Glass Works
James N. Davis	Asst. to pres., Vertol Aircraft Corp.	Prof. of physics, Univ. of Charleston
William E. Boom	European sales mgr., Vertol Aircraft Corp.	Consultant to Edward P. Curtis
Robert A. McIntyre	Dir. sales, Horizons Inc.	Simmons Aerocessories, Inc.
Edmund B. Parke	Dir. Production Div., Reaction Motors, Inc.	Asst. to pres., Designers for Industry
T. R. Marks	Exec. asst. to vp, Aviation Gas Turbine Div., Westinghouse Electric Corp.	Production engr. and works mgr., Fairchild Engine Div.
J. M. Miller	Head, design activity, equip. for Talos Missile, Bendix Aviation Corp.	Engineering dept.
E. F. Lapham	Chief electronics engr., Talos Missile, Bendix Aviation Corp.	Television and broadcast receiver division
Wendell E. Phillips	Dir. engrg., Mack Electronics Div., Inc.	Supv. design activities Talos guidance system
Dr. J. Victor Hughes	Asso. scientist, research staff, Republic Aviation Corp.	Mgr., engrg. section, Air Associates
Ralph Carlisle Smith	Asst. to pres., Nuclear Products-Erco div., ACF Industries, Inc.	Dir. general physics lab., Continental Can Co.
James J. Gilligan	Exec. asst. to gen. mgr., Axelson Mfg. Co.	Asst. dir., Los Alamos Scientific Laboratory
George Tooby	Pres. and dir., Computer Engineering Associates	Consultant
Stanley W. Koenig	Dir. adv., Olin Mathieson Chemical Corp.	Consulting engr.
James C. Sampson	Head, Infrared Projects Dept., Avionics Div., Aerojet-General Corp.	Asst. dir.
Roy L. Queen	Aerobee-IGY coordinator, Aerojet-General Corp.	With Aerojet since 1954
Y. C. Lee	Dir., research and planning, Liquid Engine Div., Aerojet-General Corp.	Asst. mgr., Test and Field Service Div.
Charles D. Harris	Gen. mgr., Utica-Bend Corp., a division of Curtiss-Wright Corp.	With Aerojet since 1949
Charles R. Strang	Chief engr., Tulsa Div., Douglas Aircraft Co.	VP and dir. engrg., Crosley and Bendix Home Appliance divisions, Avco Mfg. Corp.
E. J. Behrman	Supt., aircraft engines assembly and test operations, Allison Division, General Motors	Asst. chief engr.
Allan B. Fredhold, Jr.	Gen. mgr., General Logistics, subsidiary of Aeroquip	Asst. supt. Plant mgr.

AIRLINE

Capt. Howard W. Phillips	Chief pilot, Hawaiian Airlines, Ltd.	Pilot
Thomas D. Toberty	Dir. of personnel, Slick Airways	Personnel and ind. rel. mgr., Pan American World Airways
Rolf K. Foss	Asst. dir. of tariffs, Northwest Airlines	With Scandinavian Airlines System
Eduardo Schoueri	Intercontinental sales coordinator, VARIG Airlines	Asst. to gen. mgr., Panair do Brasil
Robert J. Doyle	Dir. press relations, Northwest Airlines	With Milwaukee Journal
Miss Evelyn Webster	Dir., Patricia Stevens Airline Stewardess School	With Capital Airlines
James Walker, Jr.	VP-traffic and sales, Civil Air Transport	Dir. passenger service, Pan American World Airways, New York

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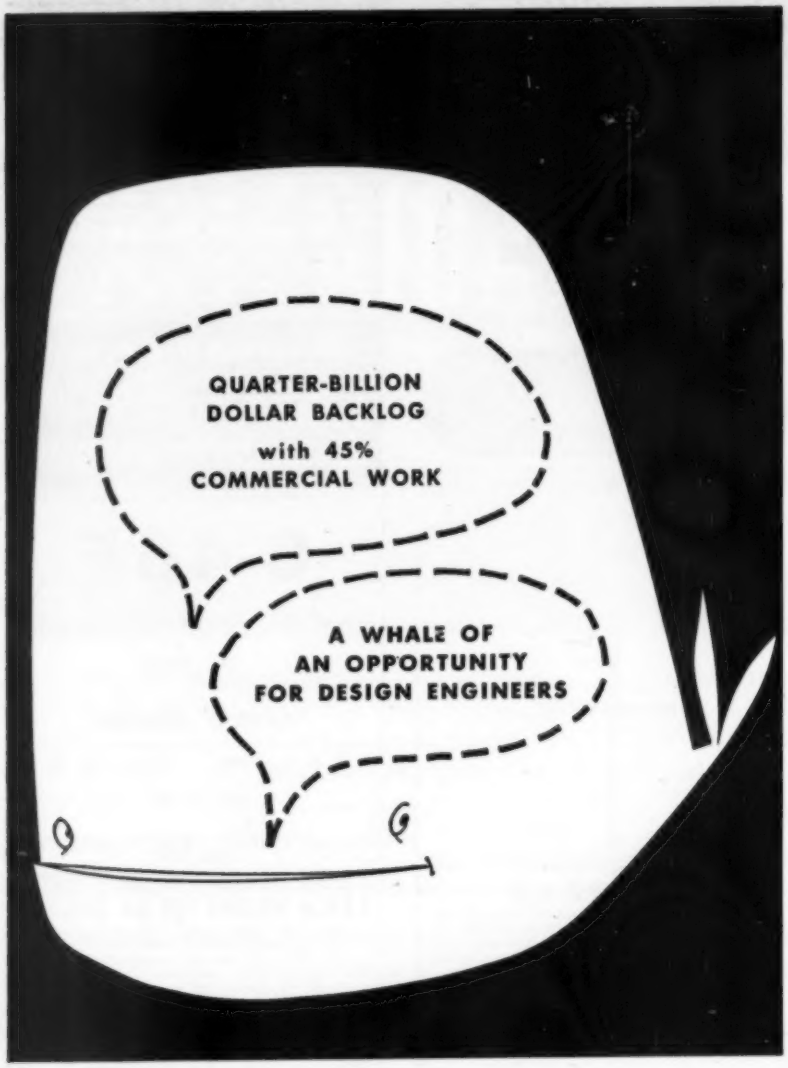

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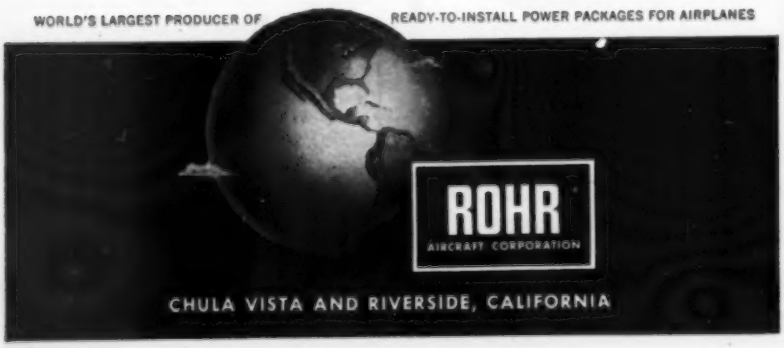

BOOKS

Night Fighter. *By C. F. Rawnsley and Robert Wright. Published by Henry Holt and Co., 383 Madison Ave., New York 17, N. Y. 382 pp. Price, $4.50.*

This book tells of the part played by RAF radar-equipped night fighter squadrons and the methods used to intercept German aircraft during World War II. From personal experiences, the authors have managed to convey some of the trepidation and excitement of aerial warfare when relying entirely on radar to seek out intruders.

Aircraft of the Royal Air Force 1918-57. *By Owen Thetford. Published by Putnam and Co. Ltd., 42 Great Russell St., London W. C. 1. Price $7, plus postage.*

This authoritative, comprehensive 528-page reference work contains more than 200 photos of aircraft and helicopters, together with engineering drawings, specifications, armament data, procurement figures and squadron numbers. Starting with the early biplanes of 1918, the author has covered every aircraft used by the RAF with the exception of certain civil types impressed into service at the outbreak of World War II.

General View of Japanese Military Aircraft in the Pacific War. *Compiled by the staff of Aireview. Published by Kanto-Sha Co. Ltd., Tokyo. Distributed in the U.S. by Hampton Books, Hampton Bays, N.Y. 127 pp. Price, $6.50.*

One of the few books that gives almost complete coverage of Japanese military aircraft during the war in the Pacific. Published in two parts, one in Japanese and the other in English. The latter part unfortunately lacks the illustrated form of the Japanese edition.

Radio Aids to Air Navigation. *By J. H. H. Grover, Philosophical Library, New York. 138 pages, illustrated. Price $6.*

Written for students learning to fly and as a concise reference work, this book is a comprehensive review of civil radio aids to navigation. Both enroute and terminal area aids including radar are covered.

Systems used in Europe as well as those in the U.S. are reviewed on a semi-technical basis. The book is profusely illustrated. An appendix carries chart material for such systems as Decca, and formulae and conversion factors.

Air Force, a Pictorial History of American Airpower. *By Martin Caidin in cooperation with the U.S. Air Force. Rinehart & Co., Inc., New York. 232 pages, illustrated. Price $10.*

Beginning with 1907 and the establishment of an Aeronautical Division within the Army Signal Corps, this volume traces the history of U.S. military aviation to the present. The author has selected some 400 pictures from about 850,000 he examined in the Pentagon file and he builds a clear, startling and dramatic account.

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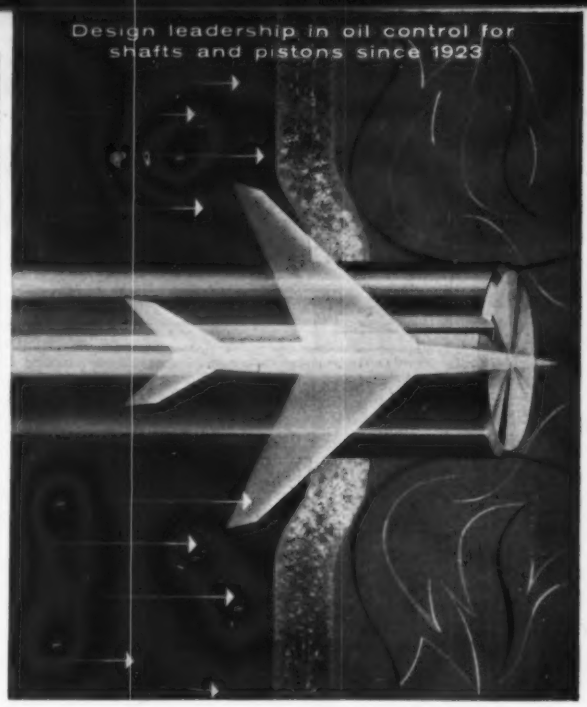
OTHER PUBLICATIONS AND SERVICES . . . American Aviation Daily: Daily News service for the entire industry, $200 per year. Managing Editor—Keith Saunders. **World Aviation Directory:** twice-yearly listing of products, people and organization, $9.00 each (U.S.A. and Canada); $10.00 each Overseas. Managing Editor—Marion E. Grambow. **Official Airline Guide:** Monthly publication of airline schedules, fares. World-Wide Edition: $19.50 per year, everywhere. North American Edition: $13.50 per year in U.S.A. $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Director—Robert R. Parrish. **Missiles and Rockets:** Magazine of World Astronautics. For those in missiles and rocket industry and satellite science, $8.00 for 1 year; $12.00 for 2 years (U.S.A. and Canada); Overseas—$9.00 for 1 year; $14.00 for 2 years. Managing Editor—Erik Bergaust. **Air Traffic News (Incorporating Air Traffic Digest)** Daily rates and tariff news, $200 per year; Managing Editor—Mary Miller. **Airports:** Weekly newsletter for airport officials, suppliers and services. Air mailed every Friday, $25 per year. Managing Editor—Wallace I. Longstreth. **Air Information Division,** 595 Broad Avenue, Ridgefield, N. J. Phone: Whitney 5-8850. Director—Edward H. Henkler. **Who's Who in World Aviation:** First Edition over 2,000 biographies of aviation's leaders, 345 pp. Deluxe bound, $10.00 per copy postpaid. **Aircraft Year Book. Aviation Facts and Figures** (Official Publications of Aircraft Industries Association).



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EN ROUTE

by Wayne W. Parrish

From Tokyo to Okinawa and Formosa

IT WAS LATE on a Saturday night when Dave Hickler of Civil Air Transport picked me up at the Imperial Hotel and drove me out to Tokyo's international airport for a 1 a.m. departure on a CAT DC-4 bound for Okinawa and Taipeh, Formosa.

There's a considerable amount of night airline activity at Tokyo. The well-lighted terminal with its many concessions and snack bars and shops again struck me as being a good functional operation. Did you know that the terminal was built by and is operated by a private corporation? Probably the only one of its kind in the world. It's a straight business proposition—and pays off (although the airlines are socked high fees).

It is 1,382 miles from Tokyo to Taipeh, so we wouldn't reach the Okinawa stop until dawn.

The passengers were an odd lot. Although we were departing from Japan, I think all on board were either Chinese or American. In front of me were Wego, the second son of Chiang Kai-Shek, and his attractive bride. They had been secretly married in Tokyo and were on their way home to Formosa to get the blessing of the Generalissimo and Madam Chiang. There had been quite a merry sendoff by friends at the airport.

But what really seemed out of place on an airline in the Orient was a basketball team and rooters, all American teenagers, who were returning to Okinawa after winning quite a victory in Tokyo. All sons and daughters of American servicemen and officers, these kids were in high spirits after their victory. Half the time I felt as though I were in some U.S. town on a Saturday night.

The CAT DC-4 was pretty plush, all two-abreast seating, and the seats were comfortable. There was music before takeoff and on landing. The stewardess was a pretty Chinese gal with that customary intriguing split skirt. Cabin announcements were in Chinese and English.

The captain was M. D. "Doc" Johnson, of Norristown, Pa., who began flying with CAT nine years ago when the operations under Claire Chennault were on the mainland. Doc Johnson had enough experiences in those days of keeping one hop ahead of the Reds to fill a half dozen books.

I managed to get a little sleep before we arrived at Okinawa. First time I'd ever been there. Even though it was about 5 a.m., there was quite a crowd of parents on hand to meet the basketball team. Those of us who were transiting went into the quonset hut terminal, a pretty dreary place reminiscent of war-time Pacific operations, and we got a chit for a soft drink or coffee in the equally dreary snack bar. I saw somebody eating ice cream so I ordered some for myself, probably the first time I've ever had ice cream as a prelude to breakfast, but it was good.

I didn't see much of Okinawa, certainly nothing to remind one of the colossal job the Yanks had in taking the place from the Japs in World War II. The airport is right off the sea.

After takeoff we were served breakfast and much to my surprise the passengers were offered a choice of juice and choice of scrambled or poached eggs. It was a fine feast.

Before arriving in Taipeh I was able to shave and clean up and was pleasantly surprised at the spacious facilities. Also I discovered a toilet seat in an airplane that swings up when not in use, just about the greatest invention since the Wright Brothers. Later I learned that Hugh L. Grundy, CAT president, thought of the idea and placed it in use in all CAT planes. Not only that but he placed the toilet in a compartment separate from washing facilities. From the standpoint of servicing, convenience and sanitation, brother Grundy's simple but commonsense ideas appear to me to merit the Collier Trophy.

Our DC-4 swung in over the mountains of northern Formosa through heavy haze and landed at Taipeh. I found quite a reception committee waiting. There was Brig. Gen. Benjamin G. Davis, Commanding Officer of the 13th USAF, who had been advised of my arrival by General Kuter; Grundy, president of CAT; C. J. Rospert, v.p. of CAT, and Joe Sykes, d.s.m for Northwest Airlines, along with a reporter and photographer.

I was whisked through immigration and customs and driven to the Grand Hotel, which is quite a place. I had a cottage suite, air-conditioned and pretty swank. Then we had a council of war about a program. I found they had already had one typed out which I could follow if I felt up to it with little sleep. Missing some sleep wasn't going to deter me from seeing as much as I could in two days, so within an hour or so, I was off in a Chinese Air Force C-47 piloted by General Davis headed for Tainan at the south end of the island. Grundy and some Chinese Air Force officers went along.

It was quite a trip, circling all of the fine new air bases en route. From the air the vast rice fields were quite fascinating too. I had no idea so much of Formosa consisted of rice growing. The island is flat on the west side but mountainous along the east and no land is left uncultivated.

At the fine field at Tainan we were greeted by Chinese Air Force officers and taken to the officers' club where Col. C. H. Juan, commander of the First Fighter Force, was host at a first-rate luncheon.

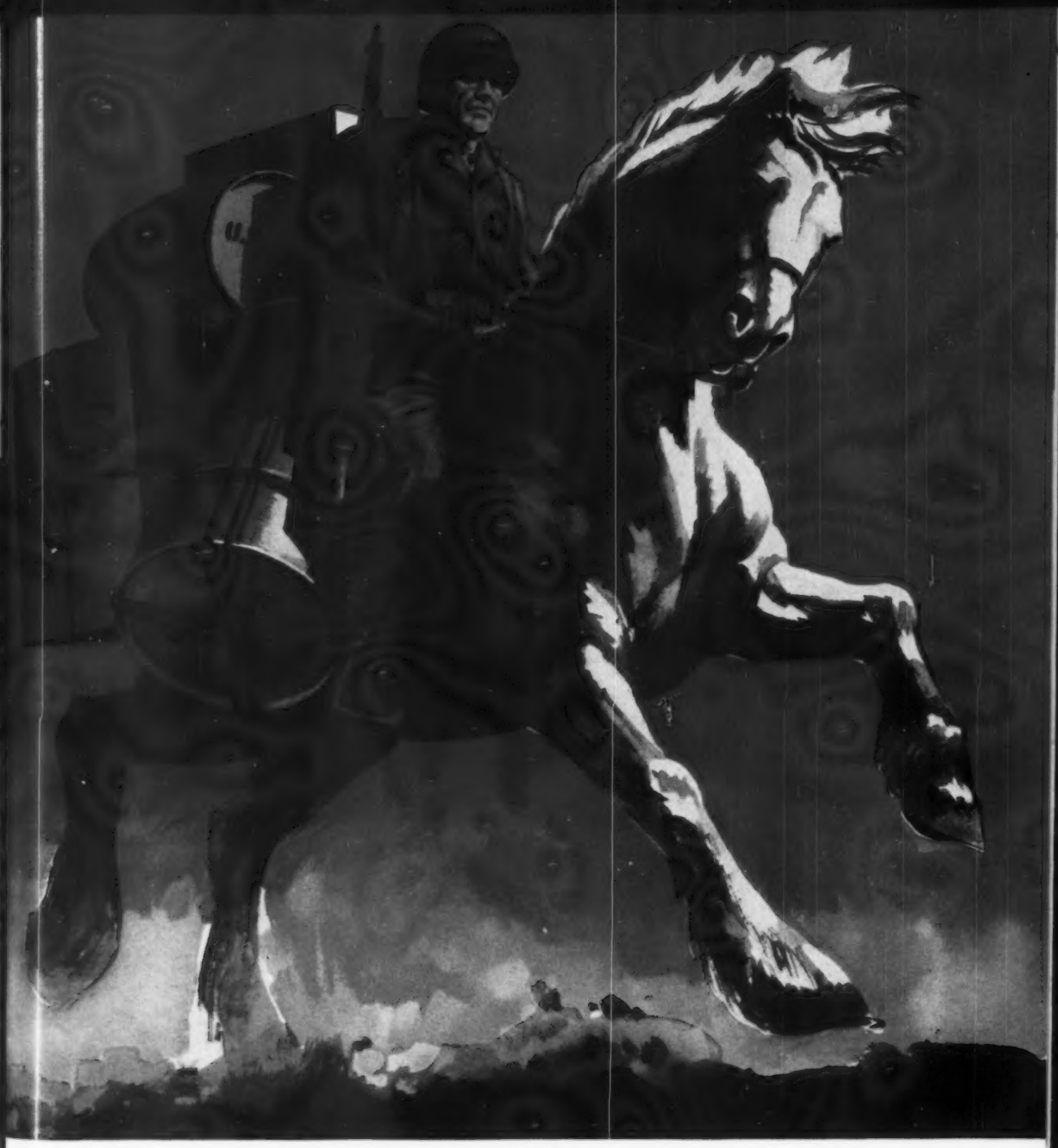
WWP sits on mat on floor; leaning against back rest, at a Japan Air Lines dinner in Tokyo. The gal was there to make life comfortable.

Then we toured the well-equipped air base. Maybe the Chinese Nationalists don't have much with which to invade the mainland, but they're mighty well equipped to give the mainland Reds a hot reception if the latter ever try to invade Formosa.

On the base is a compound set aside for a very fine maintenance base for CAT. When I walked through the gates I got a start when I saw a shiny C-46 with a brand new paint job reading "Delta Airfreighter." Tainan in Formosa is about the last place I'd expect to see a Delta Air Lines plane of any kind, but as I learned, Delta had bought five C-46s from CAT and CAT did a complete modification job on each before ferrying to Atlanta.

In mid-afternoon General Davis flew us in the C-47 to the Pescadores, about a third of the way between Formosa and the mainland. The treeless islands were high in the news not too far back. They are occupied mostly by Chinese fishermen. I toured a very first class radar station and got some idea of how well organized the Nationalists are to meet any contingency. On that very day they had completed a night mission deep into the mainland dropping propaganda leaflets. Daytime operations are restricted because of Red Air Force activity but the night missions are conducted normally without a slip or any opposition except ineffective flak.

LEAVING TOKYO ON CAT, a send-off by Dave Hickler, regional director for CAT, at Tokyo Airport.



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